June 10, 1920 American Machinist Vol. 52, No. 24

ROLLER-CHAIN

for Tractors and Power Transmission

Special Correspondence

The use of roller chain as a means of power transmission has, within a comparatively short time, been greatly augmented by the application of the chain to motor trucks, tractors, and other internal-combustion-motor-driven machinery. The service is exceptionally severe, not only because of the necessity for transmitting the maximum energy per unit of weight, but to a greater degree because of the shocks to which this class of machinery is subjected.

THE Spaulding Chain Co., of Bloomfield, N. J., manufacturer of chains for power transmission, are fitting up a large new shop for the manufacture of roller chain for use on motor trucks and tractors.

The demand for chain for this purpose far exceeds the present productive capacity of the makers, and orders are booked for delivery far in the future. The chain made by the Spaulding Co. does not differ materially from that made by other makers, some of whose machinery and processes have been described in this paper, but they have developed special tools and methods to meet their own peculiar requirements that may possible be of interest to our readers. The component parts of the Spaulding Chain are shown in Fig. 1. There are, of course, two forms of link used to make up this chain: the inner link, which carries the rollers that come in direct contact with the sprocket teeth and thus form the actual working members of the chain; and the outer link, which serves to string the working links together. While the outer links are subject to the same tensile strain as the inner links, they do not come in contact with anything and consequently the wear from friction is limited to a very slight turning movement of the studs within the tubes of the inner links. Each inner link is composed of two side bars, two tubes and two rollers; shown separately at *A* and assembled at *B*, in Fig. 1. At *C* may be seen the outer link, partly assembled; consisting of two side bars, two studs and two cotter pins. The studs are cut off and the ends rounded in an automatic screw machine. There are no shoulders on these studs; experience having shown that the shoulder introduces a weak point in the chain that is entirely unnecessary. The only machine operation on the stud after it comes from the screw machine is the drilling of the cross-hole for the cotter pin, and this is done on the semi-automatic machine shown in Fig. 2. In this machine six drill spindles run continuously, while a two-position reciprocating fixture before them holds twelve pieces to be drilled. The operator has only to remove six drilled pieces and insert six undrilled ones while the drills are working on the other six. When the drill recedes the fixture unlocks and moves back while the twelve levers, shown in the picture under the operator's hands, move to the right through an angle of about 30 deg. in which position they move forward, closing the jaws on the pieces to be

FIG. 3. BURRING THE TUBES

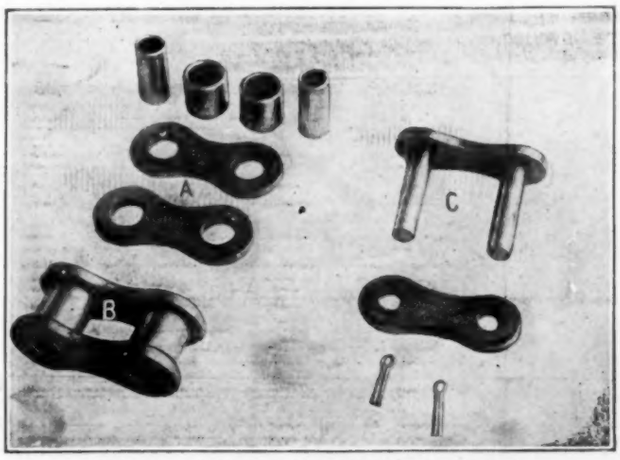


FIG. 1. PARTS OF SPAULDING ROLLER CHAIN

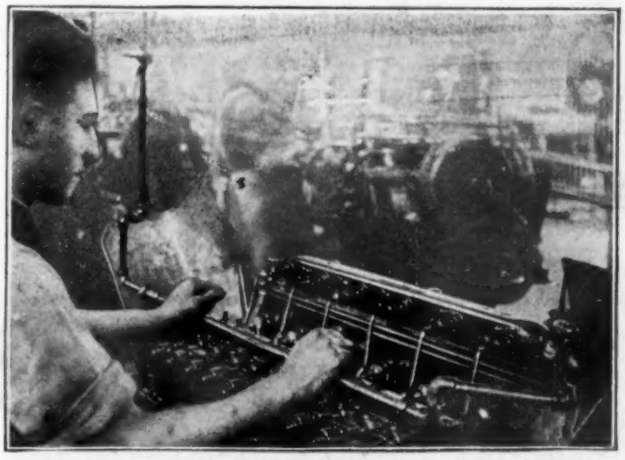


FIG. 2. SEMI-AUTOMATIC MACHINE FOR DRILLING COTTER-PIN HOLES

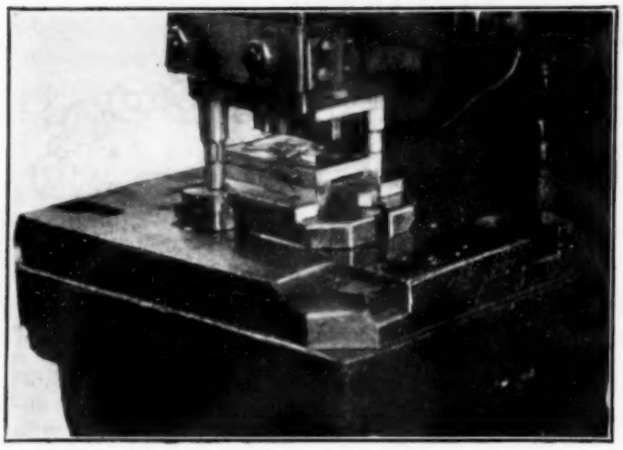


FIG. 4. THE BLANKING TOOLS

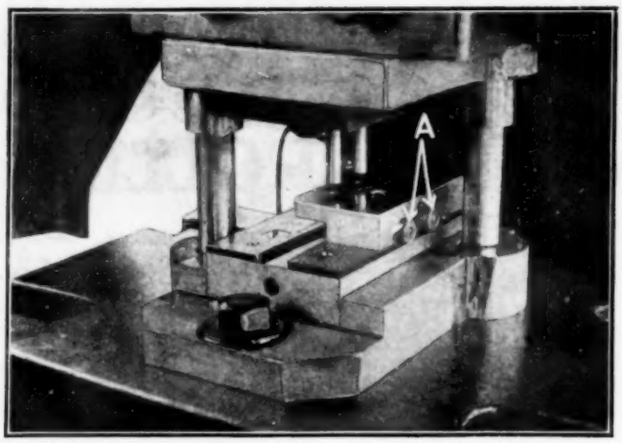


FIG. 5. THE PIERCING TOOLS

drilled and at the same time locking the fixture against the drill pressure. The drills are moved forward to their work by intermittent cams.

The movement of the fixture carries the six drilled pieces out of the line of drills while bringing into line the six that the operator has just loaded. At the same time the jaws holding the finished work are released. The operator now takes out the drilled studs and puts in others, ready for the reverse movement.

Little Trouble from Drill Breakage

The drills work under a flood of lubricant, and the intermittent movement imparted to them by the cam keeps them fairly free from chips; therefore there is little trouble from drill breakage. The operator is kept busy loading and unloading the fixture, the movement of which is continuous. It can be arranged, however, to stop after each reversal, in which case it is started with a pressure on a foot treadle.

The tubes and rollers are also products of the automatic screw machines and come from these machines complete except for a burring or chamfering operation to break the corners of the holes. The burring is done by means of a countersink in the chuck of a sensitive drill press.

Several rollers are stacked in a clamp as shown in Fig. 3, being held by the pressure of a thumbscrew at the end. Other sizes of clamps are used, some being made to take two rows of rollers. The countersink, or burring tool, is so constructed that it cannot cut too deep.

The side bars are made from a selected grade of cold-rolled steel, being blanked, two at a stroke, in tools like those shown in Fig. 4. The stock is fed through by hand and located by a finger stop that is tripped by a stud on the punch pad. The blanking tools are set in a substantial pillar press, which insures accurate alignment and long life to the tools. Piercing, swaging, and shaving tools are set in the same design of pillar press.

The Piercing Tools

A set of piercing tools is shown in Fig. 5. The pieces are fed in from the front to a stop and are ejected after piercing by a spring knockout in the stripper. Two spring-actuated plungers, *A*, Fig. 5, are set horizontally in the stripper block with their inner ends projecting perhaps $\frac{1}{8}$ in. beyond the vertical face of the block. They are high enough above the surface of the die so that a blank will pass freely under them, and their lower edges are bevelled.

FIG. 6. THE PIERCING OPERATION

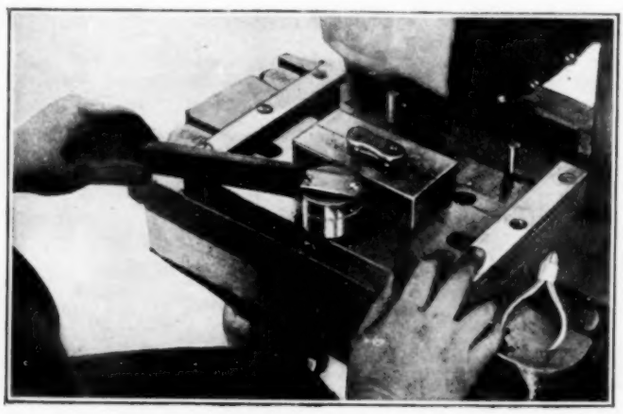


FIG. 8. FIRST ASSEMBLING OPERATION ON LINKS

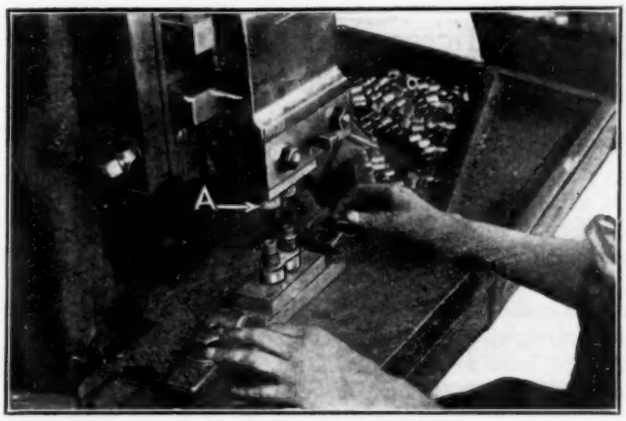


FIG. 9. PUTTING SECOND SIDE ON INNER LINK

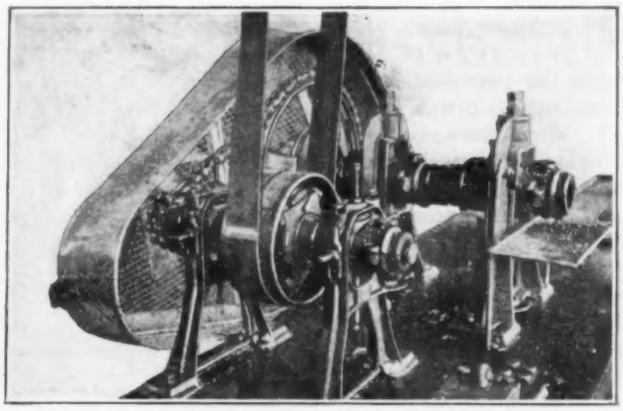


FIG. 11. THE CHAIN JACKING MACHINE

When the punches rise they naturally bring up a pierced blank with them until the latter is stopped by the under face of the stripper. In coming up this far the blank strikes the bevelled edges and forces the plungers back against the action of their springs. As soon as the punches draw clear out of the blank, the tension of the spring snaps the plungers forward until they are stopped by the collars on their outer ends, and the sudden movement shoots the freed blank to the left out of the tools, and against a sheet-metal hood which deflects it into a box on the floor. Fig. 6 shows the piercing tools in operation.

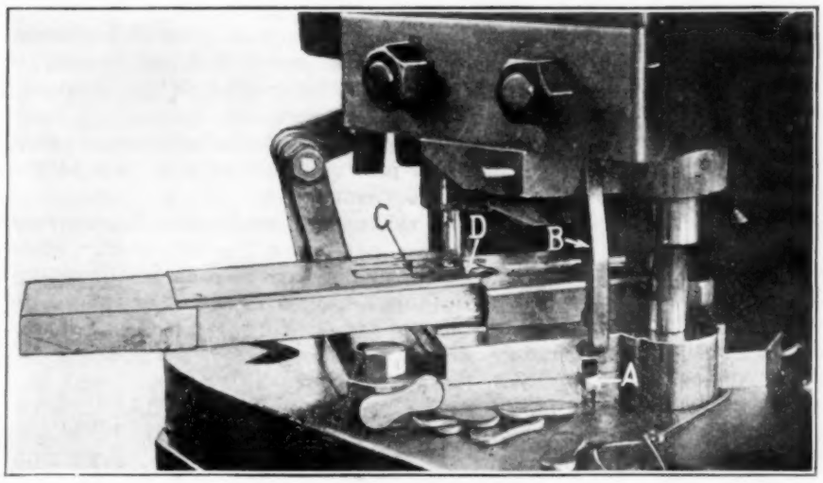


FIG. 7. THE STAMPING TOOLS

Each outer link is stamped with the firm's trade mark, the tools for stamping being shown in Fig. 7. The stamp is in the lower die and is free to move up and down; resting in its lower position upon a support sufficiently sturdy to withstand the pressure necessary to stamp the impression into the work, but capable of being adjusted to give the desired impression on the work.

The support is cut away in the center to allow the lever *A* to extend under the stamp. When the press gate comes down the hinged latch *B* hooks under the projecting end of the lever *A* and as the gate rises the stamp rises with it lifting the link out of the depression in the die and allowing it to be pushed endwise out of the die by the next incoming link. The stamp does not get in the way of the incoming link for the reason that it lifts but a very slight amount and almost immediately drops back again; the movement being just sufficient to knock the stamped link out of the die.

The feed is by lever and slide, driven from the usual disk on the press shaft. The inclined stack, or hopper, of sheet metal, was not in place when the picture was made. The opening in the cover plate through which the links drop in front of the feeding-in slide may be seen at *C*, and immediately in front of it at *D* a spring finger holds the pieces from being thrown too far forward by their momentum.

A swaging operation is performed on the inner links, rounding the inner edges of the blank especially near the center of the link, for the purpose of lessening or eliminating the possibility of having a link "hang up" on a sprocket tooth. The tools used are similar in design to those already shown, but the surfaces that bear the brunt of the pressure are made upon the ends of inserted pieces so that they may be easily renewed.

The individual links are assembled in a press. Fig. 8 shows the first operation in the assembly of the outer links. The two studs are placed in a clamping fixture, the side bar placed over them and forced down by the upper tool. There is no shoulder on the studs, the relative positions of the parts being determined by the assembling fixture.

From this stage they go to an electric-welding operation where they are held in special devices in the weld-

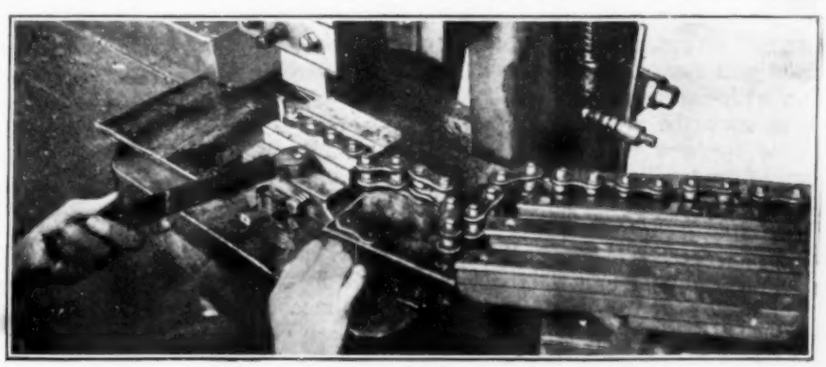


FIG. 10. ASSEMBLING THE CHAIN

ing machines, which are arranged to make the two welds consecutively instead of simultaneously. The method of welding consecutively of course requires more time, but it was found that the current flow could not be satisfactorily controlled when there were two paths for it to follow and it sometimes happened that one joint would get more than its share of current, leaving the other one with a poor weld or no weld at all.

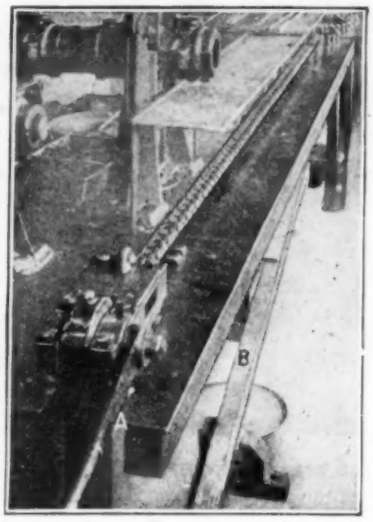


FIG. 12. THE TESTING DEVICE

As there is no way of testing the strength of the weld without destroying the link, the consecutive method was adopted, and one can be pretty sure of a good weld every time.

The first operation in the assembly of the inner link is performed in the same manner as upon the outer one. The second operation is shown in Fig. 9. The tools are very simple, the lower one being merely a gaging support for the partly assembled link. The operator puts the rolls in place over the tubes as shown in the picture; puts the side bar on the upper tool, where it is held by a small spring which may be seen at *A*, and trips the press.

The upper tool has a pair of short, piloted studs upon which the side bar is placed, and when the press gate comes down, the pilots enter the tubes and bring them into alignment with the holes in the side bar so that there is no possibility of their not entering properly.

The assembling of the links into the completed chain is shown in Fig. 10. The first part of this operation is the stringing together of the completely assembled inner links by means of the partly assembled outer ones. This is entirely a hand operation and is performed on the bench immediately to the right of the press shown in Fig. 10. As fast as the chains are made up to their specified lengths, they are run into the grooves in the receiving board shown to the right, from whence they are pulled, one link at a time, by the operator as the assembling proceeds.

After assembling, the chains are put on the jacking machine shown in Fig. 11, and run for a certain length of time to limber them up and bring all the joints to a proper bearing. At the same time any defect in the chain will show up, so that this operation, in conjunction with the following tensile test, constitutes a close check upon the product.

The operator who attends the jacking machine also applies the tensile test as shown in Fig. 12, by means of a system of weighted levers. The fulcrum of the main lever is so mounted that by turning the small lever *A* up or down, the strain is applied or released. The weight is under the floor and is directly controlled by the foot lever *B*, so that the tension can be in large measure released before moving the small lever *A*. Each chain is subjected for a certain length of time to a strain of ten thousand pounds.

A Micrometer Height Gage

By E. F. Tuttle, Jr.

The sketch shows the construction of a micrometer height gage similar to the one described by H. Kiehne on page 258, Vol. 51, of *American Machinist*. I should be afraid of trouble in trying to make the one pin he uses a good fit in each of the holes in the upright and with no looseness in the sliding block. The notched disk seems a good idea, however, for a marking point.

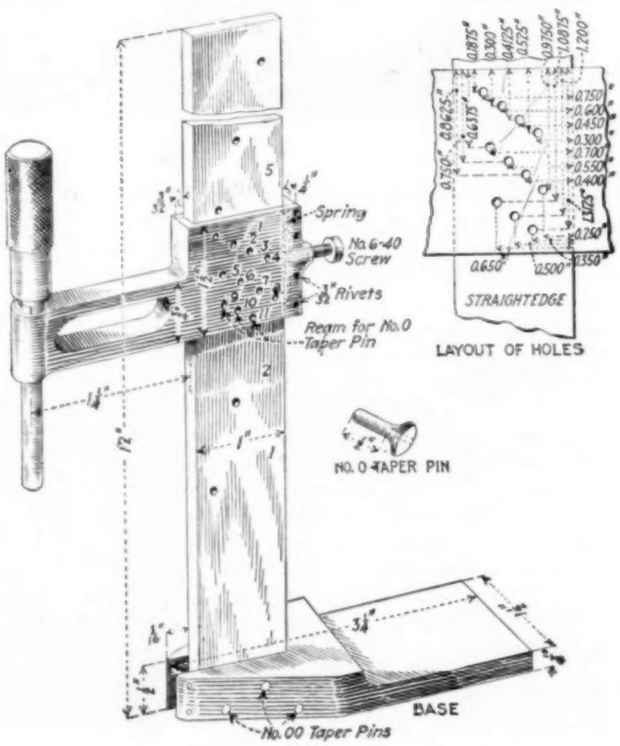
The blade of my gage is made from a standard 12-in. soft straight-edge securely pinned to the hardened and ground base and has a sliding member of soft steel which holds a regular 1-in. micrometer head. The hole in the sliding member must be made to fit this head as different makes vary in size.

The sliding block is laid out and the pin holes drilled with a small drill through one side and the micrometer head put in. Then, when the spring and screw are put in and it is put on the upright, it should be set so that the micrometer reads zero when touching the surface plate on which the gage is resting. The setscrew should now be tightened and the hole that is marked 1 in. drilled clear through the sliding block and straight-edge, and reamed for the taper pin.

Next, set the sliding block so that the micrometer reads zero when resting on a 1-in. piece and proceed as before. The other holes are drilled and reamed in the same manner and marks scribed on the straight-edge to facilitate setting.

The holes in the sliding block and straight-edge being staggered, only one pair will line up at a time so the pin cannot be put in wrong.

The accuracy of this gage depends upon the accuracy of the height blocks put under the micrometer when setting the block for drilling and as each hole is drilled separately there is no looseness in the fit of the pin in the block and straight-edge.



A MICROMETER HEIGHT GAGE

A Comparative Test of High-Speed Steels—III

By A. J. LANGHAMMER, M.E.
Industrial engineer, Thompson & Black, engineers and accountants, New York and Detroit.

This article gives a detailed description of the method of procedure in testing sixteen different commercial brands of high-speed tool steel, together with data as to the performance of each individual tool, its chemical composition, heat treatment, and hardness.

(Part II was published in our May 27 issue.)

VARIOUS steps in the preparation for the test were carefully planned and performed to insure ultimately correct data. The essential factors composed the following steps, each one of which will be briefly described: First procuring specimen bar of high-speed steel; second, making of tool; third, heat treatment of tool; fourth, grinding of tool; fifth, apparatus used and working details, and sixth, chemical and metallographic tests.

Procuring Specimen Bar of High-Speed Steel

A small order specifying the "best grade" of high-speed steel was placed with the various steel manufacturers. No mention was made of the fact that this steel was to be used for test purposes. A reasonably short time for delivery was specified. Upon receipt of shipment, each item was held for the personal attention of the man in charge of the test. After general physical inspection every bar was duly labeled and carefully stored until all the steel ordered had been received.

Making of Tool and Heat Treatment

A short piece was cut by a power hack saw (not nicked and broken) from the end of each bar and the latter then inspected at the "cut." Hereupon another piece was cut off for chemical and metallographical investigation. Finally, four pieces, each 6 in. in length, were cut for the test tools proper. Every tool was at once marked permanently with a symbol (A, B, etc.) representing the brand of steel and then stamped number 0, 1, 2 or 3 to differentiate among the tools of the brand. This designation was adhered to throughout the test and provided positive means of identification at all times as well as a concise method for comparison. The symbols chosen, too, were of such nature that they did not directly reveal the brand of the steel, which practice provides for absolute impartiality on the part of the experimenters. All the tools were then machined on a milling machine to the dimensions and tool angles indicated in Fig. 2, viz.: 6 deg. clearance at the nose and 10 deg. at the heel, 14 deg. side slope, 0 deg. back slope, 32 deg. horizontal clearance and 8 deg. vertical clearance, 84 deg. lip angle, and 90 deg. cutting angle. A slight cut was also taken from the base to insure a perfect seat. After machining, the tools were rough-ground to insure a minimum of finish-grinding upon hardening. All tools were then subjected to complete inspection and necessary corrections made, whereupon they were ready for hardening.

Once the tools were "made," and then only, every steel manufacturer or his representative was advised that a test was being conducted and they were given the choice of either hardening the tools themselves, having our man harden the tools under their direction, or send in their specifications for heat treatment and permit us to do the hardening without their supervision. It was understood, of course, that in each case the hardening had to be done in our plant and under constant observation. In the majority of cases the second proposal was accepted, i.e., our tool hardener performed the work in accordance with the verbal instructions of the steel companies' experts. Each representative had our entire equipment at his disposal and while he was at work no rival steel man was present. Our equipment was quite complete and the needs of each agent were easily satisfied.

Every man was told that the heat treatment was the only factor he could control and that but one test of four tools could be made. He was therefore duly cognizant of the great importance of his work and was perforce extremely careful. Complete observations were made as to the methods applied and the behavior of each tool carefully noted, especially while at the high heat. A separate data sheet and discussion of the different methods of heat treatment applied were given in Table II in conjunction with the summary of chemical analysis.

Two furnaces were employed, one for the low or preheat and the other for the high heat. In each case the temperatures were adjusted to the satisfaction of the steel men before the tools were put into the furnace. Semi-muffle type oil-fired furnaces were used.

Grinding of Tool

It is generally conceded that probably more tools are spoiled through overheating in grinding than in any other way. As pointed out above under "Making of Tool," all tools were rough-machined and rough-ground before hardening, thereby reducing the chances for ruining in grinding. A high-grade tool grinder performed the work under constant supervision, and in this way the danger of overheating was minimized and the correct values of cutting angles assured. The machine used was a Taylor automatic tool grinder and particular care was exercised to see that the copious stream of cooling water provided was applied to the nose of the tool directly at the point in contact with the abrasive wheel. After the tools had been finish-ground, each one was inspected for flaws in the material and all cutting and clearance angles were checked. The base of each tool, in addition, was inspected for deformation, since a perfect seat in the holder is essential.

After the tools were put through the first run they were reground to the original design except that the radius at the nose of the tool was double that of the original value, i.e., $\frac{1}{16}$-in. radius on the first run and $\frac{1}{8}$-in. on the second run. Of course, in the regrind there was more chance for injuring the tools. It is felt, however, that with the care and vigilance that was exercised, this possibility was eliminated.

Apparatus Used and Working Details

As stated in a foregoing paragraph, the machine tool used was a new 8-in. Lo-Swing lathe. The general set-up was shown in Fig. 1. Attention is especially

invited to the particularly rigid method used for holding and driving the work. It is also to be observed that the set-up included but one tool block and that the tool traveled from the point shown to the dome end of the cylinder. The method of clamping the tool has been clearly shown and attention is called to the unusual area of tool base clamped and supported, as compared with the ordinary lathe toolpost.

"Feeding" the Tool

When each cut was started the tool was carefully "fed in" until the proper depth of cut ($\frac{5}{32}$ in.) was reached. The tool was then fed by hand longitudinally for about $\frac{1}{4}$ in. for the purpose of checking the "turned" diameter. In this way the depth of cut was held very close—within the limits of plus or minus 0.0025 in., to be exact.

Only after the correct depth of cut had been attained was the longitudinal power feed engaged (0.054 in. for first run and 0.090 in. for second), the stop watch being started at the same time. As soon as the cut was "across," the watch was stopped and the time recorded. This was repeated until the tool failed, whereupon the total time or life of the tool was at once computed by the observer, and the figures later checked in the office. All other tools were then put through the test in the same way. Whenever a tool failed in cutting, the "burned" part of the cylinder that was caused by the tool failing was turned off with a tool that was not a test specimen, thereby relieving the succeeding test tool of the handicap of cutting metal hardened by burning. In this way every test tool started to cut under identical conditions, which was especially desirable in this test because of the relatively short length of the material cut.

As a further check on the life of each tool, the actual number of cylinders machined was recorded and then compared with the total time credited to the tool.

After the life of each tool was recorded and these data checked, the results were plotted and are shown in the graphical representation on "curve sheets," reproduced in Figs. 5 and 6. The time or life of each tool was plotted as abscissæ, while the brands were indicated as ordinates. In both runs the value representing the total life of each set of tools is shown on the same sheet. It will have been noticed that each individual tool was stamped with a symbol representing the particular brand from which it was made and that the tools in each brand were numbered 0, 1, 2 and 3. By using this differentiation and referring to the data sheets on chemical analysis, heat treatment, and the curve sheets, the why and wherefore of exhibited characteristics can usually be traced quite easily. To facilitate this work, however, a series of data sheets under "Notes on Performance" have been included below.

Chemical and Metallographical Tests

It has been pointed out that a short piece was cut from each bar of steel for the purpose of procuring the chemical analysis of each brand. The work was done in the Packard laboratory and as some of the data appeared questionable, check samples were sent to a local laboratory and again to New York, each report concurring in our analysis, except in the case of uranium.

Both outside laboratories reported more than 0.20 per cent uranium in brand "D" but only a possible trace in half a dozen other brands.

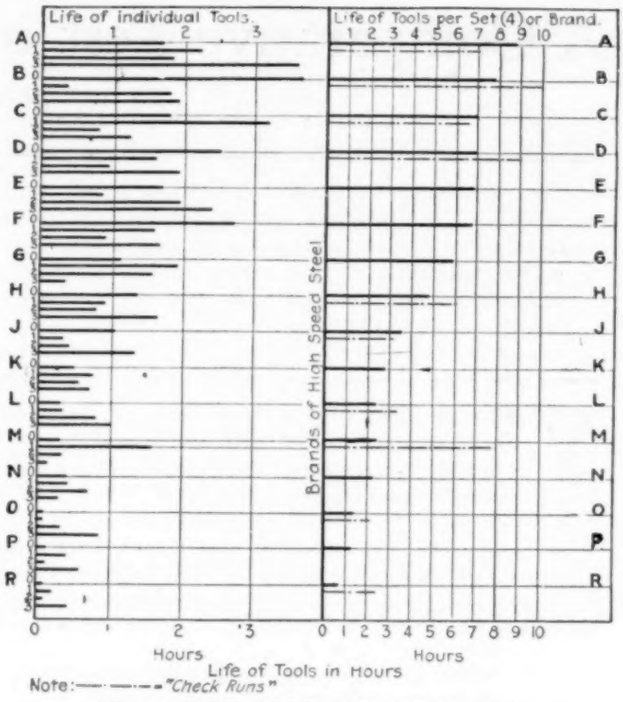


FIG. 5. CURVE SHEET OF FIRST RUN

Turning Liberty motor cylinders 5¼ in. diameter. Tool with ⅛-in. radius nose; cutting speed, 35 ft.; feed, 0.054 in.; depth, $\frac{5}{32}$ in.

Several microphotographs were made and will be published later with a separate discussion.

Table VII, giving the scleroscope hardness of each individual test tool, is included for checking purposes. It is contended that the degree of scleroscope hardness is in no way related to red-hardness, once a certain initial hardness (about 80) has been attained. In other words, if one tool registers 83 and another 88, it does

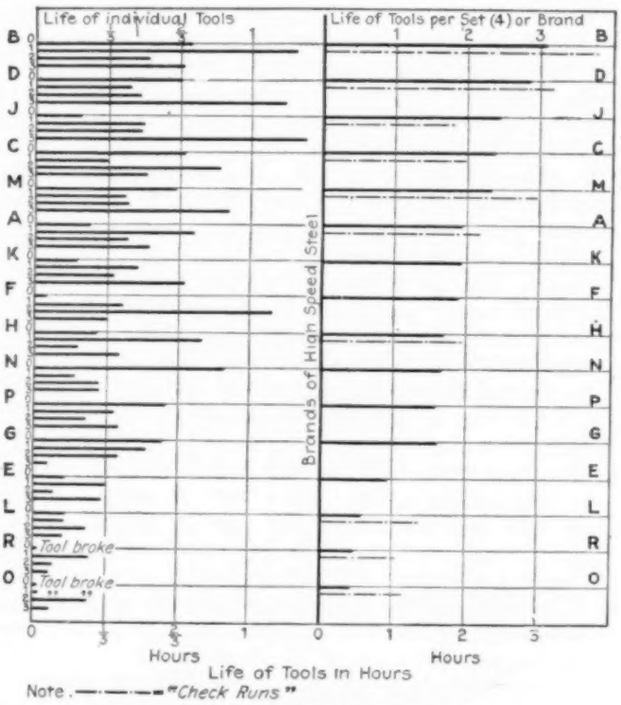


FIG. 6. CURVE SHEET OF SECOND RUN

Turning Liberty motor cylinders 5¼ in. diameter. Tool with ⅛-in. radius nose; cutting speed, 35 ft.; feed, 0.090 in.; depth $\frac{5}{32}$ in.

not follow that there will be any difference in the cutting qualities of the two. Hardness readings should be taken of each tool after the finish grinding for the first run and used as a general indicator. The given data were secured at that time. The readings taken at the nose tip are, of course, lower in value than those of the group taken farther back on the lip surface. This is due to the fact that in the first instance the drop hammer rebounded from an overhung surface, while in the latter case the footing was solid, the heel being directly beneath the point where the reading was se-

TABLE IV. NOTES ON PERFORMANCE OF FIRST RUN

Brand	No.	Time	No. of Cylinders	Remarks
L	0	20 6 min.	4	Dulled quickly; then failed.
	1	20 5 min.	4	Dulled quickly; then failed.
	2	47 8 min.	9	Failed slowly.
	3	56 2 min.	11	Failed quickly.
		Total time, 2 hr. 25 min. 6 sec.		
C	0	1 hr. 48.0 min.	21	Showed wear early but continued to cut.
	1	3 hr. 12.9 min.	38	Failed rapidly.
	2	49.0 min.	10	Failed suddenly.
	3	1 hr. 17.3 min.	15	Showed wear early but continued to cut.
		Total time, 7 hr. 7 min. 12 sec.		
A	0	1 hr. 40.4 min.	20	Tool indicated wear and then failed.
	1	2 hr. 14.5 min.	27	Failed slowly.
	2	1 hr. 52 min. 42 sec.	22	Failed slowly.
	3	3 hr. 39 min. 18 sec.	44	Failed gradually.
		Total time, 9 hr. 26 min. 54 sec.		
B	0	3 hr. 40.5 min.	44	Failed very slowly.
	1	21.6 min.	4	Nose chipped.
	2	1 hr. 51.5 min.	22	Failed slowly.
	3	1 hr. 56.7 min.	23	Failed after showing dullness.
		Total time, 7 hr. 50 min. 18 sec.		
O	0	4.6 min.	1	Tool broke.
	1	2.1 min.	1	Tool broke.
	2	20.5 min.	4	Dulled quickly; then failed.
	3	52.2 min.	10	Failed suddenly.
		Total time, 1 hr. 19 min. 24 sec.		
M	0	19 min. 17 sec.	4	Showed chipped cutting edge.
	1	1 hr. 36 min. 6 sec.	19	Failed suddenly.
	2	20 min. 56 sec.	4	Showed slightly chipped cutting edge and failed quickly.
	3	7 min. 15 sec.	2	Failed quickly.
		Total time, 2 hr. 23 min. 34 sec.		
H	0	1 hr. 21 min. 30 sec.	16	Failed slowly.
	1	56.0 min.	11	Uniform wear.
	2	47.0 min.	9	Failed quickly.
	3	1 hr. 39 min. 38 sec.	20	Failed slowly.
		Total time, 4 hr. 44 min. 8 sec.		
K	0	31 min. 14 sec.	6	Dulled quickly.
	1	46 min. 49 sec.	9	Failed suddenly.
	2	34 min. 56 sec.	7	Nose chipped slightly but continued to cut.
	3	44 min. 14 sec.	9	Failed quickly.
		Total time, 2 hr. 37 min. 13 sec.		
J	0	1 hr. 6 min. 28 sec.	13	Failed slowly.
	1	19 min. 8 sec.	4	Dulled; then failed quickly.
	2	27 min. 36 sec.	5	Dulled; then failed rapidly.
	3	1 hr. 20 min. 5 sec.	16	Failed quickly.
		Total time, 3 hr. 13 min. 17 sec.		
D	0	2 hr. 29.0 min.	30	Failed slowly.
	1	1 hr. 37.3 min.	19	Failed slowly.
	2	59.0 min.	12	Failed gradually.
	3	1 hr. 55.9 min.	23	Failed slowly.
		Total time, 7 hr. min. 12 sec.		
P	0	4.2 min.	1	Failed quickly.
	1	24.9 min.	5	Dulled early.
	2	6.4 min.	1	Failed quickly.
	3	36.0 min.	7	Failed suddenly.
		Total time, 1 hr. 11 min. 30 sec.		
N	0	23.0 min.	4	Dulled quickly but continued to cut.
	1	25.8 min.	5	Failed quickly.
	2	44.1 min.	9	Failed slowly.
	3	18.3 min.	4	Showed wear, then failed.
		Total time, 1 hr. 51 min. 12 sec.		
R	0	3.4 min.	1	Nose broke.
	1	9.8 min.	2	Failed quickly.
	2	0.8 min.	0	Failed quickly.
	3	27.3 min.	5	Failed gradually.
		Total time, 41 min. 18 sec.		
E	0	1 hr. 44.0 min.	21	Failed quickly.
	1	52.3 min.	10	Failed rather slowly.
	2	1 hr. 58.9 min.	24	Failed slowly.
	3	2 hr. 24.0 min.	29	Failed slowly.
		Total time, 6 hr. 59 min. 12 sec.		
F	0	2 hr. 45.8 min.	33	Failed slowly.
	1	1 hr. 36.3 min.	17	Chipped but continued to cut.
	2	55.5 min.	11	Failed quickly.
	3	1 hr. 38.8 min.	20	Showed wear early.
		Total time, 6 hr. 56 min. 24 sec.		
G	0	1 hr. 8.1 min.	14	Showed wear but continued to cut.
	1	1 hr. 55.6 min.	23	Failed slowly.
	2	1 hr. 33.1 min.	19	Cut roughly but held the size.
	3	19.3 min.	4	Failed quickly.
		Total time, 5 hr. 54 min. 6 sec.		

TABLE V. NOTES ON PERFORMANCE OF SECOND RUN

Brand	No.	Time	No. of Cylinders	Remarks
C	0	41 min. 42 sec.	10	After 30 min. 54 sec., rapid wearing was apparent though the tool continued to cut.
	1	19 min. 13 sec.	5	Failed suddenly.
	2	51 min. 36 sec.	12	Showed wear three minutes before failure occurred.
	3	33 min. 12 sec.	8	Failed gradually.
		Total time, 2 hr. 25 min. 43 sec.		
N	0	53 min. 30 sec.	14	Failed suddenly.
	1	11 min. 24 sec.	3	Showed wear after the second cylinder.
	2	18 min.	4	Failed slowly.
	3	18 min. 18 sec.	5	Failed slowly.
		Total time, 1 hr. 41 min. 12 sec.		
E	0	9 min. 12 sec.	2	Tool indicated dullness and then broke.
	1	20 min. 30 sec.	5	Failed gradually.
	2	5 min. 24 sec.	1	Tool broke.
	3	19 min. 48 sec.	4	The nose chipped after 4½ min., but continued to cut, though irregular.
		Total time, 54 min. 54 sec.		
O	0			Broke on first run.
	1			Broke on first run.
	2	15 min. 30 sec.	4	Dulled quickly but continued cutting and then failed suddenly.
	3	4 min. 30 sec.	1	Tool broke.
		Total time, 20 min.		
M	0	38 min. 30 sec.	9	Failed very slowly.
	1	25 min. 22 sec.	6	Failed suddenly several minutes after showing wear.
	2	26 min.	7	Tool broke.
	3	54 min.	14	Failed suddenly.
		Total time, 2 hr. 22 min. 52 sec.		
P	0	37 min.	9	Failed slowly.
	1	22.5 min.	5	Failed rapidly after becoming dull.
	2	14 min.	4	Failed suddenly.
	3	24 min. 48 sec.	6	Failed gradually after first indication of dullness.
		Total time, 1 hr. 38 min. 18 sec.		
G	0	36 min. 18 sec.	9	Showed wear 1 minute before it failed.
	1	32 min. 18 sec.	8	Failed gradually in last 3 minutes.
	2	24 min.	6	Failed slowly.
	3	3 min. 36 sec.	1	Tool broke.
		Total time, 1 hr. 36 min. 12 sec.		
H	0	17 min. 42 sec.	4	Grew dull 4 minutes before failure.
	1	47 min. 6 sec.	9	Failed very slowly.
	2	12 min. 54 sec.	3	Began to dull on the second cylinder.
	3	24 min. 36 sec.	6	Failed suddenly.
		Total time, 1 hr. 42 min. 18 sec.		
A	0	15 min.	4	Nose chipped slightly after seven minutes running, then failed gradually.
	1	44 min. 12 sec.	11	Failed very slowly after first indication of dullness.
	2	26 min. 30 sec.	6	Failed gradually in the last four minutes.
	3	31 min. 6 sec.	8	Gave indication of dullness eight minutes before failure.
		Total time, 1 hr. 56 min. 48 sec.		
L	0	8 min. 36 sec.	2	Dulled quickly, wear increasing rapidly until failure occurred.
	1	8 min. 12 sec.	2	Failed slowly.
	2	14 min. 6 sec.	4	Showed wear on second cylinder but failed slowly.
	3	7 min.	2	Failed gradually after the cutting edges chipped slightly.
		Total time, 37 min. 54 sec.		
B	0	43 min.	11	Failure extremely slow after showing initial dullness.
	1	1 hr. 13 min.	18	Failed suddenly.
	2	30 min. 16 sec.	8	Failed slowly.
	3	40 min. 3' sec.	10	Failed very slowly after first signs of dullness.
		Total time, 3 hr. 6 min. 46 sec.		
J	0	12 min. 30 sec.	3	The nose of the tool broke off while feeding across.
	1	30 min. 48 sec.	8	Failed rapidly after indicating wear.
	2	29 min. 42 sec.	7	Showed wear two minutes before failure occurred.
	3	1 hr. 14 min.	18	Gave no indication of wear, the nose of the tool breaking while the power feed was engaged.
		Total time, 2 hr. 27 min.		
R	0			Tool broke when feeding in by hand to the proper depth.
	1	15 min.	4	Grew dull soon after the start.
	2	5 min.	1	Failed rapidly.
	3	4 min. 12 sec.	1	Failed rapidly.
		Total time, 24 min. 12 sec.		

TABLE V. (Continued)

Brand	No.	Time	No. of Cylinders	Remarks
K	0	11 min. 48 sec.	3	Failed suddenly.
	1	28 min. 48 sec.	7	Became dull and failed within one minute.
	2	22 min. 12 sec.	6	Failed six minutes after the first signs of wear.
	3	42 min. 30 sec.	10	Failed very slowly.
		Total time, 1 hr. 43 min. 18 sec.		
D	0	47 min.	12	Failed very slowly.
	1	26 min. 42 sec.	7	Failed very slowly.
	2	29 min. 18 sec.	7	Failed gradually.
	3	1 hr. 10 min.	17	Gave indication of wear 35 minutes before failure occurred. Almost impossible to ruin the tool as it continued to cut while at a high red heat.
		Total time, 2 hr. 53 min.		

A marked characteristic of this steel is the tendency to dull quickly but continue to cut. It is also very difficult to "burn," and cools quickly after the cut is finished.

F	0	2.4 min.	1	Tool broke.
	1	25 min.	6	The nose of the tool broke but continued to cut for ten minutes before failing.
	2	1 hr. 7 min.	17	The nose of the tool chipped after 15 minutes.
	3	20 min.	4	Dulled quickly but continued to cut.
		Total time, 1 hr. 54 min. 24 sec.		

TABLE VI. RECAPITULATION OF TEST RESULTS

First Run				Second Run			
Brand	Total Time for Four Tools, H. Min. Sec.		Average Time for One Tool, H. Min.	Brand	Total Time for Four Tools, Hr. Min. Sec.		Average Time for One Tool, Min.
A	9	26 54	2 21.7	B	3	6 46	46.6
B	7	50 18	1 57.5	D	2	53 ..	43.2
C	7	7 12	1 46.8	J	2	27 ..	36.7
D	7	1 12	1 45.3	C	2	25 43	36.4
E	6	59 12	1 44.8	M	2	22 52	35.7
F	6	56 24	1 44.1	A	1	56 48	29.2
G	5	54 6	1 28.5	K	1	43 18	25.8
H	4	44 8	1 11.0	F	1	54 24	28.6
J	3	13 17	48.3	H	1	42 18	25.5
K	2	37 13	39.3	N	1	41 12	25.3
L	2	25 6	36.2	P	1	38 18	24.5
M	2	23 34	35.9	G	1	36 12	24.0
N	1	51 12	27.8	E		54 54	13.7
O	1	19 24	19.8	L		37 54	9.5
P	1	11 30	17.9	R		24 12	6.0
R		41 18	10.2	O		20 ..	5.0

TABLE VII. HARDNESS OF TEST TOOLS

Brand		Scleroscope Reading At the Extreme Tip of the Nose	Scleroscope Reading ¼ In. Back of Nose	Brand		Scleroscope Reading At the Extreme Tip of the Nose	Scleroscope Reading ¼ In. Back of Nose
J	0	70–75	80	H	0	68–70	82
	1	62–64	78		1	65–70	82
	2	65–68	82		2	65–70	77
	3	62–67	78		3	70–73	80
C	0	65–68	78	M	0	68–70	80
	1	65–70	80		1	65–70	80
	2	65–70	88		2	70–73	85
	3	65–70	78		3	70–72	87
A	0	68–70	82	L	0	70–75	85
	1	73–75	82		1	70–75	82
	2	65–70	82		2	68–70	75
	3	65–70	85		3	70–72	82
R	0	70–72	85	B	0	65–70	78
	1	68–70	82		1	65–68	75
	2	70–72	80		2	70–73	80
	3	70–75	80		3	70–75	85
D	0	73–75	83	P	0	60–65	72
	1	60–65	75		1	58–60	65
	2	65–70	79		2	60–62	72
	3	74–76	90		3	65–67	70
N	0	70–72	80	R	0	65–68	78
	1	62–64	80			60–65	77
	2	70–74	80		2	60–64	75
	3	70–72	87		3	60–65	72
F	0	70–72	82	K	0	65–70	78
	1	65–70	85		1	62–65	81
	2	60–65	78		2	60–65	74
	3	70–72	82		3	65–70	80
O	0	65–70	77				
	1	65–70	82				
	2	68–70	80				
	3	65–68	80				

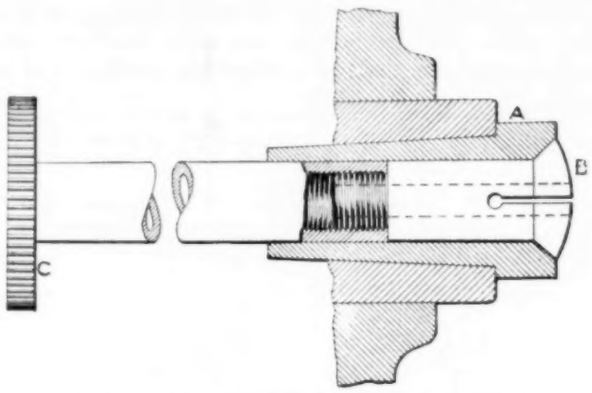
cured. It will be noted that in general the hardness varied from 75 to 85, or within 10 points.

(Part IV, the last of the series, will be published in an early issue.)

Collets for the Milling Machine

BY F. C. HUDSON

On experimental work or where manufacturing is being done in a small way, it frequently becomes desirable to use collets in the milling machine spindle. This was easily done in the case shown by simply making the outer or master collet, shown at *A*, to fit the taper in the milling machine spindle and boring it in place to fit the collet *B*, which belonged to a bench lathe in the same shop. The draw-in tube is threaded at one end to fit the collet, the wheel *C* on the other end being a discarded change gear from a small lathe, having teeth fine enough to answer very nicely for a grip. This is extremely simple and answers every purpose, utilizing collets from other machines to advantage.

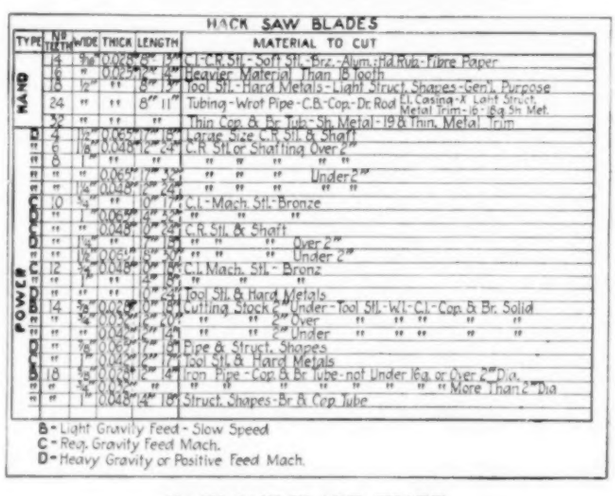


A COLLET IN THE MILLING-MACHINE SPINDLE

Chart for Hack-Saw Blades

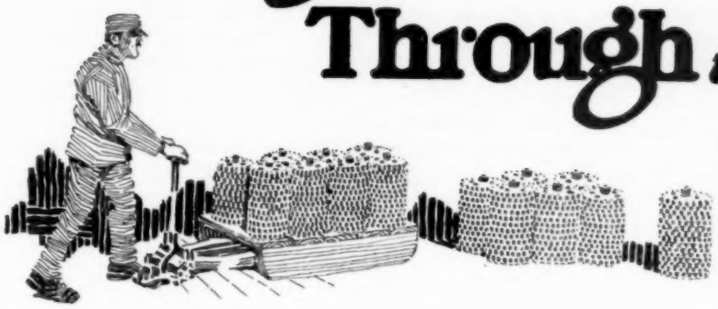
BY S. JONES NELSON

The chart shown in the illustration is a time saver when hung in the vicinity of hack-sawing machines, especially when, as is usually the case, these latter are run by men not any too well posted on the kinds of blade to be used for various materials. It enables even an indifferent operator to select the proper blade without trouble or delay; or if there is a battery of saws, to assign each bar of material to the machine best adapted to handle it.



HACK-SAW BLADE CHART

Routing Gears and Machine Parts Through the Factory



By J. A. Urquhart
Brown & Sharpe Manufacturing Co.
Providence R. I.

*In treating the routing system which has been developed in a large and up-to-date plant, all the phases, such as ordering, planning, scheduling, dispatching and checking, are of importance. The author describes a system which has given good service for a number of years, the forms used being reproduced here to show the actual operating mechanism of the plan.**

THE purposes of routing are to enable the starting of a part at the right time over the shortest and best route, to have it finished in stock or available when required, and to have it in progress for no longer a period than is necessary to manufacture it. Our object at the Brown & Sharpe plant is to have the part finished or in storage for a short period of time before it will be required, and to have control of the part at all times during its passage through the factory. We also plan to give positive dates on future deliveries.

Before starting the description of routing I want to speak of a few of our factory consists of ten manu-

tory consists of ten manufacturing buildings, including a gray-iron foundry. The employees number about 7,500 persons. We manufacture milling, grinding, gear-cutting and screw machines, both plain and automatic, in all a total of eighty-four sizes; also a complete line of small tools, cutters, sewing machines, and barber's clippers. For all this varied product the unfinished, semi-finished and finished parts must be routed. These conditions are mentioned because they differ from those to be found in a factory making only one line of goods.

Method Used Before Routing System Was Installed

The plan in use before adopting our present routing system was a central station with a set of progress cards. As the work left each department a move ticket was supposed to be sent to the central station notifying that the work had been moved to the next department, but in many cases the foremen would forget to send tickets to the central station when they dispatched the work. Also move tickets were recorded on the wrong progress card. At times operations would be changed due to various reasons, such as hard stock or because parts were sent back by the inspector for repairs, and for these and other causes the records were not satisfactory. We also used chasers, but they were expensive and did not get satisfactory results.

Before routing was introduced we had in use: Sample tags, chasers, progress cards, work-following tickets, dating of orders on progress cards, order books, dating of orders in foremen's order book, lists of stock, and lists of progress kept by the various foremen. Moreover, all drawings were mounted on metal plates or boards, which required storage. Duplication of cards and orders occurred; but most detrimental of all was the trouble caused by foremen and sub-foremen leaving their own departments and going to other departments while chasing work. The plan for routing gears is the outcome of our making estimates on gear work. In making these, especially for new work, it is our practice to get the time required for each operation and delivery dates from every department that has an operation on the gear.

When estimating we make use of printed forms, one of which is sent to each of the department foremen who has work to perform on the piece. On this form, Fig. 1, is given the number of pieces required, and a drawing of the piece, Fig. 2, is furnished for other information. The form and drawing are returned to the estimating department by each foreman with an estimate of the number of hours required to do the work, and also with a list of the special tools required by his department to make the piece. These estimates are filed for future reference.

When an order on which we have estimated is received, a production record card, Fig. 3, is sent to each foreman, giving him a record of his estimate. This record is to remind him of what he has promised to do, and on it a space is provided for keeping a record of the time spent on the job and for checking up each day.

The summary card, Fig. 4, is used to show the sum total of labor and machine time as estimated, and it has a drawing or photostat of the gear pasted on the back. These cards are filed in a cabinet according to the pitch diameter of the gear, and the record is valuable for quick estimating and also as a permanent record. It was the desire to make use of this recorded information that led us to incorporate it in the form of a route card, the form which we decided to adopt being very similar to a railroad time table.

How the Route Card Is Made

Many of our gear orders are for special gears and are generally wanted by the customer about the time

*Paper presented at the annual meeting of the American Gear Manufacturers' Association, Detroit, April 29, 1920.

we get the order to make them. This means that the best possible date must be given.

When an order for gears is received it is assigned a job number by the timekeeping department, and against this all labor and material used is charged. The drafting department furnishes the necessary drawing, Fig. 2, and a list of materials or parts. This drawing generally gives a list of any special tools that may be required, and the list or order of operations is furnished or approved by the foreman of the gear department.

ESTIMATE Nov. 29, 191

CUSTOMER'S NAME

MR. THOMPSON

PLEASE ESTIMATE ON THE FOLLOWING:	MACH.	HOURS MAN
ROUGHING		
400 DIFF. GEARS.	120	120
28 T. 4-5 P		
MILLING OIL GROOVE	47	47
PER BLUE PRINT C-54118		

TOOLS WANTED: M.H. GARVEY
SULLIVAN

4 CUTTERS 3 O.D. 1⅛ HOLE H.S.
2 SPECIAL MILL ARBORS
1 INDEX PLATE

Nov. 29, 191 MR. A. MICHAND

NOTICE:
THIS ESTIMATE MUST HAVE YOUR CAREFUL ATTENTION
BROWN & SHARPE MFG. CO.

FIG. 1. FORM USED FOR ESTIMATING ON GEAR WORK

The next step is to get actual or estimated time for each operation from the department that has the particular operation to perform. Each department foreman is told the date that the job will arrive in his department, and he gives the routing department the date on which the work will leave. The date given by the foreman who does the last operation gives a final route card date, but this may not be near enough to the delivery date asked for by the customer to be satisfactory. When this happens the foreman of the gear department checks the routing, and from his records or experience points out the operation time which in his opinion can be shortened; and, if possible, the routing department schedules a shorter time. The final date is then set and the route cards are made. The route card date is lengthened by a number of days, depending on the size of the job, to get a satisfactory shipping date for the customer.

The route card is typed with a hectograph ribbon, and a copy is made on a duplicating machine for each foreman that has an operation on the gear. The route card and drawing are put in an envelope and stay with the work until it reaches the final inspection. The copies of the route card are sent to the various foremen.

The route card, Fig. 5, has "operation" and "date due" columns, which correspond to the "station" and "time due" columns on a railroad time table. There are in addition three other columns, one to show the date the parts were received, one to show the number of pieces sent along, and one to show the number of pieces spoiled, if any. The number of pieces sent along plus the number spoiled should always equal the number started. The route card is also used as a casting order for cast-iron gears.

Route Card Rack

Each department in the factory is provided with a rack, Fig. 6, containing forty-eight pockets, four for each month, in which are placed the copies of the route card as fast as they are issued. The copies are filed according to the date that they are due out of the department. This arrangement enables the foreman to tell at all times the quantity of work that he has to get out each week and, also, all work on order. It gives him this information in advance and shows up any work that he has not moved according to schedule.

Spoiled Work

If any pieces are spoiled a "spoiled-work" notice, Fig. 7, is sent to the routing department. On the receipt of this notice it is ascertained whether the spoiled pieces have to be replaced and, if so, the number required is started on a new route card, so that they catch up with the main lot as soon as possible.

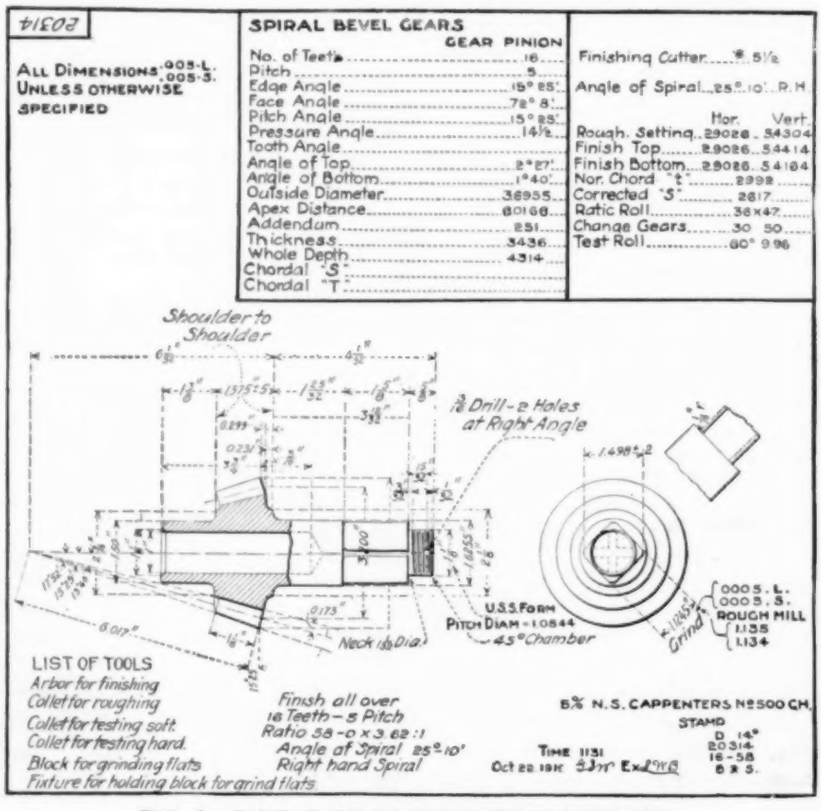


FIG. 2. SAMPLE OF DRAWING FURNISHED FOR ESTIMATING ON GEAR WORK

PRODUCTION RECORD

Mr. POTHEN Date 11-13-19

Name Firm

Time No. 7214 Time Estimated Mch. 150 Man 75

Operation THREADING No. of Pieces 1900

Remarks

DRIVING GEARS 17T. 6-8P.

Hours Estimated should be on this card before starting work. If you cannot do as well or better than Time Estimated notify Foreman of floor. If he cannot produce better results, he will notify the man responsible for this Record.

DATE	HOURS	PIECES	DATE	HOURS	PIECES	DATE	HOURS	PIECES
	MACH.							
Nov. 15	13.	257			MACH.	MAN		
" 16	7.	143	2500 =					
" 17	6.	128						
" 18	19.	381						

FIG. 3. PRODUCTION RECORD CARD USED FOR RECORDING WORK IN EACH DEPARTMENT

COMPENSATING GEARS Work No. T 28 Quantity 10000

Kind For Time No. Face Hole P 7-9

	MACH.	MAN		MACH.	MAN
Drawings		20	8 Ft. G. Cut Machine 5 BRUSH WHEELS		
Patterns CHUCKING	1248	624	O. S Machines, and P. 23		
Forging BRUSH		225	28 in. Spiral G. Cut Machine		
Cleaning Castings			Double Tool Gleason Planer		
Machinist's Work		890	12, 24 & 36 in. Gleason Planer		
Screw Machines			Bilgram Planer DRILLING		800
Milling Machines			Auto. Rack Cut Machine		
Milling Machines, P. & W.			~~Index Drilling Machine~~ R.V.G.P.	1400	1400
Lathes, Special			22 in. Index Hobbing Machine		
~~Hartness~~ Lathes	3000	1500	Emery Wheel Grinding	1400	1400
Pinter & Johnson Lathes			Filing		550
Small Vertical Boring Mill			Hardening $ ——		
Large Vertical Boring Mill			Hobs		
O. S. G. Cut Machines			Tools $ ——		
Hob Machines			Gauges $ ——		
P3, P4, P11 and P13 H.S.	1600	1600	Inspection		624
P5, P6, P14 and Duplex			Beams		150

Material .10-15 CAR. ST. Date of Estimate Date of Order Remarks

FORGINGS $ ——

FIG. 4. SUMMARY CARD TO SHOW TOTAL OF MACHINE AND LABOR TIME. DRAWING OF PART IS PASTED ON BACK

It is necessary at times to change the dates on a route card, due to various reasons, such as delay in receiving raw materials, to get an earlier delivery date, men not working, machines broken down, neglect on part of foreman or too much work. To take care of this condition a rerouting ticket is provided, Fig. 8, which gives the routing department the information necessary to reroute and to locate the job after rerouting. Whenever a foreman learns that the date on a route card in his department is not going to be kept, he must notify the routing department at once, and at the same time give a new moving date if possible.

With the information on the rerouting note the routing department can take steps to hold the final date or to make the extension as short as possible. This can be handled in several ways, such as overtime or getting help from another department, as there are several departments doing similar work. The important thing is for the foreman to give prompt notice to the routing department in order that the control of the job may not be lost, and as a rule the foremen give this notice. No chasers or follow-up men are used, except in special cases. When a date cannot be kept a reroute card is made out and taken to the department which has the work, the drawing is put in the new reroute envelop, and the old route card taken away. The fact that there is always a route or reroute card with the work helps the routing department to control all work in progress at all times.

TIME NO.	TOTAL ON ORDER	PATT. MARK OR SYMBOL	QUANTITY ROUTED
2925	190 Sets	20314	last 50

NAME OF PART Bevel Pinion - Mercer 3755D

MATERIAL	HUB DIAM.	HUB LENGTH	CORE	COMPLETED DATE
See Print				9-12-19

OPERATIONS	BENCH FLOOR MACH	DATE PARTS ARE DUE IN DEPT.	DATE PARTS WERE RECEIVED	NO. OF PCS. SENT ALONG	NO. OF PCS. SPOILED
Print received		6-9-19			
Deliver forgings to McGhee	Roche	6-10-19	6-10-19	50	
Turn	McGhee	6-10-19	6-10-19	50	
Inspect	Baird	7-7-19	7-3-19	50	
Drill	Huse	7-9-19	7-7-19	50	
Grind	White	7-11-19	7-9-19	50	
Thread	Pothin	7-15-19	7-10-19	49	1
Chuck	Earle	7-19-19	7-14-19	49	
Rough and Finish cut	Marfield	7-23-19	7-23-19	48	1
File	Huse	7-31-19	7-30-19	48	
Inspect	Baird	8-1-19	8-18-19	48	

FIG. 5. WORK ROUTE CARD FURNISHED TO THE FOREMEN

Scheduling to Departments

Work is scheduled to departments and not to machines, except on certain machines such as gear planing machines and hobbing machines, where the number of machines is limited. On the common classes of machines, such as lathes and drilling machines, we depend on the foreman, with the aid of his route card rack, to call the attention of the general foreman to any work that he is not sure of getting out according to schedule. This plan has its weak points, but any cure that we have seen would involve more trouble than we are having at the present time.

Dispatching and Trucking

Each foreman dispatches the work from his own department. The moving is done by the trucking department, but the foreman who works on the job last is responsible for the work until it reaches the next department. Call stations of the trucking department are located in each department of the factory and there is one central transfer station. In the morning each

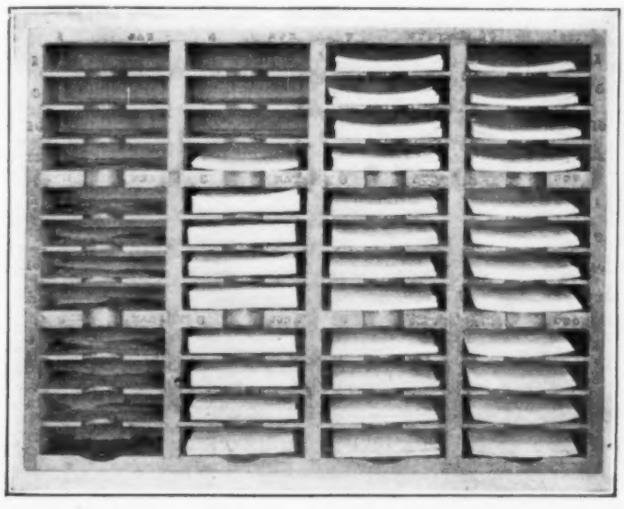


FIG. 6. DEPARTMENTAL RACK FOR FILING ROUTE CARDS

ROUTING DEPT.
RECORD OF WORK SPOILED

Quan. Spoiled 1 Sheet No. _____

Quan. Left in Lot 24

Name or Symbol SPINDLE

Time No. C3-18

Material #40 SPINDLE STEEL

Reason SEAMEY STOCK

Date 3-25-20 Signed E. YATES

FIG. 7. NOTICE OF SPOILED WORK SENT TO ROUTING DEPARTMENT

ROUTING DEPT.

Please Reroute

Quantity 110

Name or Symbol CLUTCH THIMBLES

Time No. A2049-11 Sheet No 83

From 3-26-20 To 3-30-20

Remarks:- HARD STOCK - SENT TO BE ANNEALED

Date 3-23-20 Signed ABRAMSON

FIG. 8. FORM USED FOR REROUTING WORK IN CASE OF DELAYS

trucker starts from the transfer station with any parts that are going to his station. Upon his arrival at the floor where his station is located he distributes his load, and then loads up with parts going to the transfer station. The route card with the work is the trucker's order to move.

How Stock Orders Originate

Machine parts are generally routed to go into stock, and as a rule they are allowed more time for manufacture than are special orders. This permits the use of some methods different from those used in routing gears, but most of the rules are the same. All orders for standard machinery originate in the sales department and copies of the orders are sent to the following departments: First, the timekeeping and cost departments, which open accounts for time and material and figure the cost at the completion of the job; second, the drafting department, which furnishes all necessary drawings and lists of fittings, including stock parts; third, the foreman erecting the machines, who gives the date when the machines will be finished. This date must be approved by the routing department and be satisfactory to the sales department. Fourth, the routing department, which, on receipt of the lists and drawings, makes

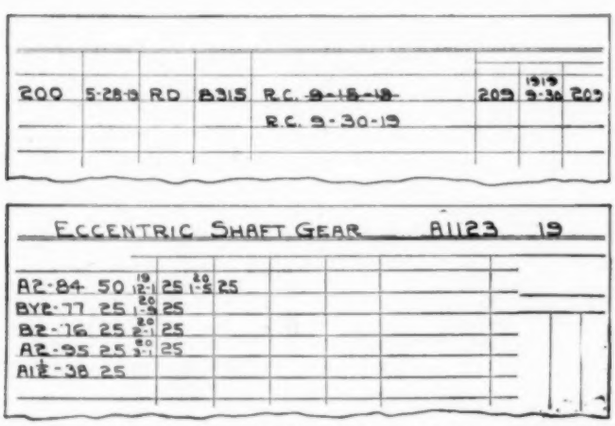


FIG. 9. FRONT AND BACK SIDES OF STOCK ORDER CARDS

requisitions for all stock parts and materials. These requisitions bear the date that parts will be wanted in the assembling or erecting departments. All special materials or parts are ordered through the purchasing department. Parts not carried in stock but manufactured as required are routed through the factory.

Ordering

When the lists of materials for a lot of machines are received in the routing department from the drafting department, the stock-parts order clerk immediately checks the list with his stock-record cards, Fig. 9. All the items required that are not in stock are ordered. Items not required for some time are held in the "tickler" until an advisable date for ordering. A copy of the order is sent to the drafting department, which in turn sends to the routing department drawings for each piece called for on the order. The material order clerk in the routing department examines each drawing and makes out requisitions for all stock parts and special parts. The drawing, together with all requisitions and a route card (without the operations or dates, but giving the number of pieces required, time number of job and name of part) are then sent to the route clerk, who proceeds to schedule and route the work. These stock-record cards are a great help to the route clerk in setting dates.

The material order clerk keeps a record, Fig. 10, of all the drawings received in the routing department. This record gives date received, when sent to routing department, and when routed.

Master Card and How Used

The method of routing is as follows: For each piece to be routed there is a master card, Fig. 11, which gives the operations, the number of hours or days required for each operation and the name of the foreman who is to do the work.

The lists of operations on our master cards are made by recording the operations in the order in which they have been performed in the past, and are changed from time to time as new methods of manufacturing require.

Time No. B00-14	Total on Order 25	TYPE OF MACHINE #00 HAND MILLING MACHINES
Ordered 10-3-19		
Cast Only		General Remarks
Go Ahead 10-3-19		
Stopped		

Sheet	Received	Cast Order	Sent R. D.	Routed	Remarks	Sheet	Received	Cast Order	Sent R. D.	Routed	Remarks
						43	10-9-19		10-24-19	11-1-19	
						44	10-9-19		10-24-19	11-3-19	
						45	10-9-19		10-24-19	11-3-19	
						46	10-9-19		10-24-19	11-3-19	
						47	10-9-19		10-24-19	11-1-19	
6	10-9-19		10-24-19	11-3-19	STAND.						
7	10-9-19		10-24-19	11-3-19	KNEE						
8	10-9-19		10-24-19	11-3-19	SADDLE	50	10-9-19		10-24-19	11-3-19	
9	10-9-19		10-24-19	11-3-19	TABLE	51	10-9-19		10-24-19	11-3-19	
10	10-9-19		10-24-19	11-3-19	DRIP PAN						
11	10-9-19		10-24-19	11-1-19	STAND DOOR	53	10-9-19		10-24-19	11-6-19	
12	10-9-19		10-24-19	11-3-19	C'WEIGHT.	54	10-9-19		10-24-19	11-3-19	
13	10-9-19		10-24-19	11-3-19	BETT. "						
15	10-9-19		10-24-19	11-3-19	SADDLE GIB						
16	10-9-19		10-24-19	11-3-19	TABLE GIB	58	10-9-19		10-24-19	11-3-19	
						59	10-9-19		10-24-19	11-3-19	

FIG. 10. DRAWINGS RECEIPT CARD OF MATERIAL ORDER CLERK

The time required for each operation is taken from the contract or job work cards when available. On new work an estimated time is gotten from the foreman having charge of that particular job. The erecting foreman gives the date on which the machines are to be finished.

The company has records obtained by experience, to show the time when each part or group must be finished in order to keep the date set for the completion of the machine. With all this information it is a comparatively simple job to divide the available time between the various operations. In the majority of cases the time given on the route card is greater than the actual time required for the operation. This helps to hold the original date on the route card when we have to reroute. On rush orders the route card is put in a red envelope, which helps the foreman to keep the job moving on time.

Record of Work in Progress

The routing department has two sets of filing cabinets, one for all work in process of manufacture, and one for work that has been finished. The work-in-progress cabinet contains a copy of the route card for every job in progress filed according to name or job number.

The completed file contains a copy of route cards for all jobs finished on which the cost has been figured. As fast as the cost department figures the job, the cards are pulled out and destroyed. With the aid of these two cabinets any job can be quickly located and the condition of all the parts for any lot of machines under construction can be found. The general rules of the routing system are:

1. Dates on route cards should be kept or bettered.
2. If a date on route card cannot be kept, the foreman should notify the routing department at once and not wait until work is finished, and on the same note give the date on which the work will go to the next operation. This reroute note should be written in duplicate, the original should be sent to the routing department and the duplicate should be pinned to the foreman's route card and filed in the rack according to the new moving date. This will remain in the rack until receipt of the new reroute copy from the routing department. Printed forms are provided for this purpose.
3. Foreman should write "Being Rerouted" on route card and sign his name and the date, whenever notifying the routing department to reroute work.
4. Routing department must reroute work promptly, but work must be kept moving during the time it is being rerouted. If a route card arrives in a department and has been marked "Being Rerouted" but has not been rerouted within three days after the date of notification, the foreman having the work must send through a new reroute note.
5. If a job should get so far behind that it is difficult to reroute to meet machine date, the routing department will notify the foreman building the machines.
6. The route card and blueprint in an envelope must be kept with the work, not on the foreman's desk.
7. The foreman's copy of the route card must be filed in the rack provided for that purpose according to the date the work is due out of the department, excepting the assembling and erecting departments on groups of machines. They should file route cards by time number.
8. Copies of route cards for jobs that have been rerouted or finished must be removed from rack promptly.
9. Foremen must not use racks to store all sorts of junk. If jobs are stopped the copies should be marked.
10. All foremen must enter on their copy of route card the date on which they receive the work. Then the routing department can get this information without troubling the foreman.
11. Route card with blueprint must be returned to routing department promptly upon completion of job.
12. The routing department is responsible for getting best dates on all outside repair orders, "customer

MASTER CARD	NO. OF PIECES	PATT. MARK OR SYMBOL	MATERIAL
TIME NO. JB10	25	JB 10 1	C.I.

NAME OF PART Bed Front Plate Sheet #9

U	OPERATIONS	FOREMAN	ACTUAL TIME IN DAYS	REMARKS
	Print received at	R.D.		
	Make castings	Foundry	25	
	Clean	Arbour	3	
	Mill	Malmberg	4	
	All drilling	Larson	6	
	Finish Milling	Malmberg	4	
	Final Inspect	Platt	2	
	Supply Department #7 Bldg. 1st Floor			
	Buckley			
	These JB10 Bed Front Plates complete are required six weeks ahead of the delivery date on the finished machines.			
	TOTAL ACTUAL TIME		76	

FIG. 11. MASTER CARD USED FOR ROUTING WORK

waiting orders," etc. It is expected that the foremen will assist them in every possible way.

13. The foreman whose name appears on the bottom of each route card is responsible for the work and will give information on any mechanical question that may come up.

Results of System

Routing started in the gear department in 1912, and is now in general use throughout our factory. The results obtained can best be shown by the following table, giving the percentage of work finished on or near the scheduled date:

Year	Total	On Time, Per Cent	One Week Per Cent	Two Weeks Per Cent
1913	24,990	76.5	84	89.5
1914	28,037	80.9	90.5	94.3
1915	43,795	68.5	80.3	88.7
1916	61,173	71.5	79	86.5
1917	66,926	87.6	90.7	93.8
1918	66,817	85	88	91.7
1919	61,622	85	87.6	90

This record would be better but for the tendency of our route clerks to play safe. They sometimes call for parts sooner than actually required and quite often the foreman making the parts knows this and breaks the rule on rerouting, making the excuse that he knew they would not be required on the date set. This applies principally to the foreman on the last operation. However, we try to impress the foreman with the fact that dates on route cards must be kept, and if in their opinion the dates are not correct, they should call them to the attention of the routing department.

In conclusion I want to call attention to two points in this plan of routing. One is its simplicity. All we ask of our foremen is to keep the schedule or else report that they cannot do so. The other point is the fact that we have been using it for five years and are getting fairly satisfactory results.

A Question in Etymology

By Francis W. Shaw
Manchester, England

"The English (or any other) language is not a fixed unsentient thing, ironbound by a set of arbitrary rules and conditions, but a living, growing entity, born of necessity and reared by custom to give expression to the intelligence of men."

In these words does Harry Senior support the language as it now is. Since "grinder" is perfectly intelligible to some men, while "grinding machine" more powerfully appeals to others, and as both terms are sanctioned by long and common usage, both are right.

Judged from the standpoint of sanction, both *are* right, but judged from the capability to give expression to the intelligence of men "grinding machine" is right and "grinder" wrong; for, by analogy with other words, "grinder" may be either a machine, a tool, or a man. Too often are we forced to circumlocution to be able to claim for the term "expressivity quite complete."

It is just the same with other words derived from terms expressive of processes or operations. What, for instance, is a "mill"? Side mills, face mills, slot mills are, of course, cutters. But is a vertical mill or a horizontal mill a cutter for vertically or horizontally cutting? The Cincinnati Milling Machine Co. mixes machine nomenclature with that of the cutters. They make universal milling machines and plain milling machines but their manufacturing machine is a "miller." This is the classification in Chapter I of their Treatise. If I asked Mr. Senior to provide me with a good "miller" would he send me a man or a machine?

Users Do Not Control Names

I do not agree that the people who use the machines control the name. It is the makers who advertise their wares, the technical journals that describe the machine, the divers writers who furnish the interesting matter we get in the *American Machinist*, who now-a-days make the names by which machines are known, if not honored, in common workshop use. The ordinary workman on this side is fast discarding his gantries, his poppets, his rings, his cogs, his pins, his knives, for the more modern bed, foot stocks, collars, gears, screws, cutters, etc.

An instance of the "power of the press": In the early days of the *American Machinist*, when it began to get distributed among the more intelligent of the shop men, there arose quite a fad for calling the drilling machine a drill press. The new name spread rapidly until discussion had shown its discordance with the real office of the machine, and now when "machine" is replacing "press" in America the new term is fast being abandoned here.

If a "mill" why not a "plane"? The Yorkshire toolmaker habitually uses "plane" as his name for planing machine, and, I fancy, would find support by analogy. If a "plane" why not a "slot" or a "gear-tooth round"? A Fellows "gear shape"? Any of these is quite as logical and equally illogical as "plane."

Over here we call a man who busies himself with mechanics a "mechanic." He is a mechanic still, though his sole work be turning, planing or other kind of machining. You in America have improved on this, calling a "machiner" (or should he be a "machine") a "machinist." And machinist being a more expressive term, it is fast growing here.

Mr. C. H. Norton may dislike the term "grinder" as an appellation for his product. It will, however, persist unless he begins to use in his literature a better (and shorter) term than "grinding machine." Might I suggest "grindor" and leave "grinder" to describe the operator.

Standardizing the Use of Suffixes

Or would it be preferable to standardize the use of the different suffixes we have expressive such as "he who," "that which," and so on: as "er," or "ar," and "ist" or "ast"? There's plenty to go around and to spare. Thus: the operator would always be an "ist," as pianist, turnist, millist; the machine would generally be an "er," as miller, planer, slotter, driller; the tool would be either without suffix or would carry the suffix "or," as "drill." "mill," "saw," "reamor." But where special terms like "lathe"—different from the name of the operation—exists, one would not say "turner" for instance, but would adhere to "lathe."

There is no need to bother about terms like "turning took"; after a time someone might start the term "turnor" for example, which, if it pleased the public, would gradually become common. Such terms as "fitter," "polisher," and "assembler" could remain, for their implements are "machines" and "tools" not particularized.

The Manufacture of Single-Cylinder Gasoline Engines—II

By J. V. HUNTER
Western Editor, *American Machinist*

The special tools and methods which have been developed to expedite the manufacture of small gasoline engines in quantity lots, have materially aided in establishing the quality and reliability of this class of machinery. Attention is called to a few of the special tooling methods.

(Part I was published in our May 20 issue.)

IN THE plant of the Fuller & Johnson Manufacturing Co., Madison, Wis., the finishing of the flywheel is expeditiously accomplished on a Gisholt vertical boring machine, Fig. 16, using the two toolposts with special tools for the different cuts. The left-hand toolpost holds the tools for boring, facing and turning the hub, while in the right-hand toolpost is placed a special toolholder *A* which carries the tools for three different cuts. The first is a roughing cut on the face of the flywheel which is done by the tool *B* held in the lower section of the holder and fed downward with a feed of approximately $\frac{3}{16}$ in. per revolution. With the toolholder in the position shown, the post is moved toward the hub and the two cutters *CC* face the sides of the rim. The form cutter *D* follows and produces a smooth finishing cut on the face and rounds up the corners at the same time.

A jig, Fig. 17, mounted on ways, is provided for boring and reaming the holes for the wristpin and crankpin bearings of the connecting rod. The position of the jig *A* is regulated with reference to the spindle by means of a stop *B* mounted on the lug *C*. The drilling of the grease-cup hole, at an angle through the large end of the connecting rod, is done in the jig shown in Fig. 18, the drill being guided by the bushing in the leaf *A* which may be swung out of the way for tapping, and for the removal of the rod.

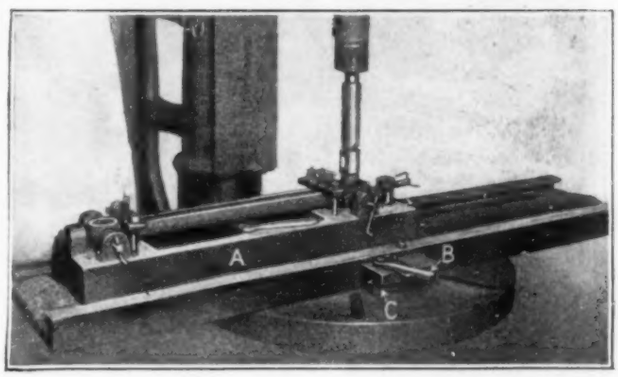


FIG. 17. SLIDING DRILL JIG FOR CONNECTING RODS

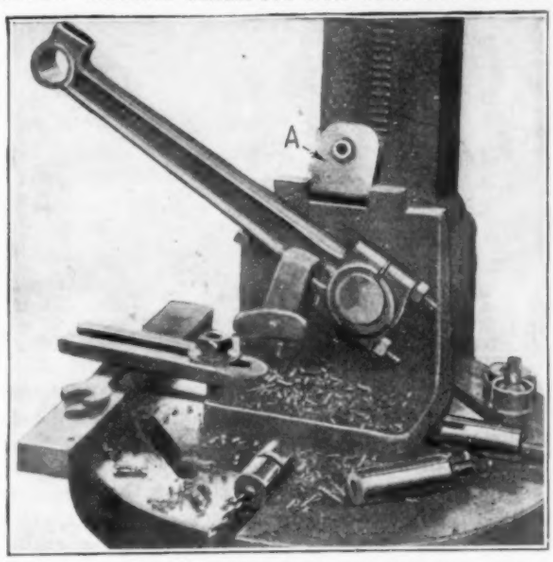


FIG. 18. JIG FOR DRILLING GREASE-CUP HOLE

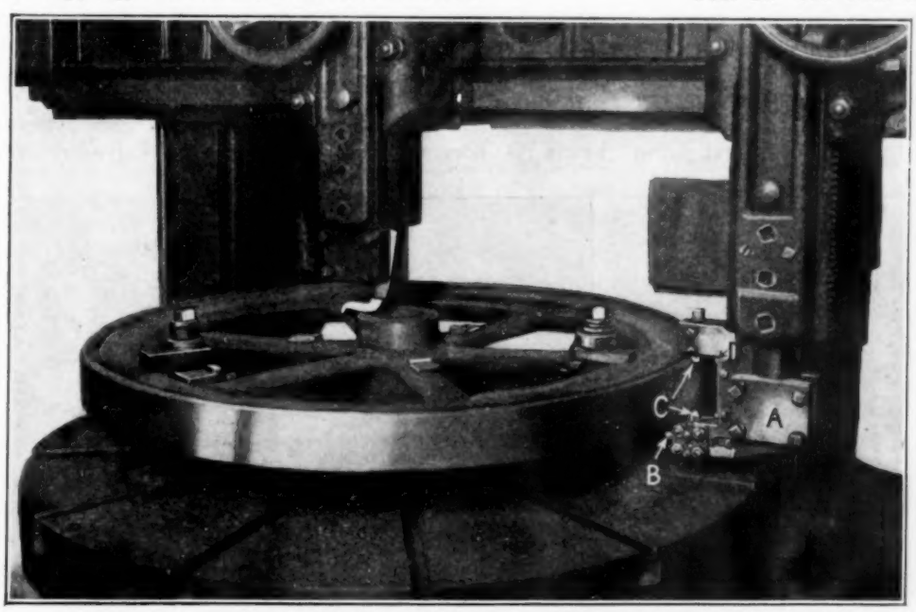


FIG. 16. SPECIAL BORING MILL TOOLS FOR TURNING FLYWHEELS

Fig. 19 shows the finish-turning operation on the crankpin of the crankshaft which is mounted in the throw blocks *A*. The struts *B* are provided to compensate any undue stress while turning, while the narrow finishing tool *C* is supported by the small jackscrew *D*.

The crankpins of the smaller sizes of crankshafts are turned in a lathe equipped for this purpose. A long extension head *A*, Fig. 20, is mounted on the headstock of the lathe and is supported by the out-board bearing *B*. The head is arranged to take various chucks *C*, in which are steel bushings *D* correctly spaced from the center of the headstock spindle for

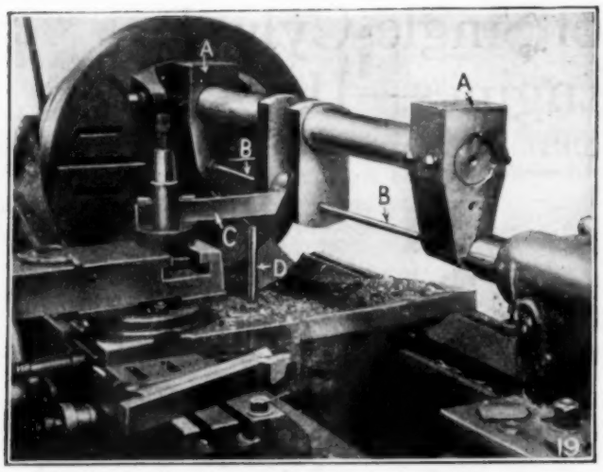


FIG. 19. TURNING CRANKPIN BEARINGS OF LARGE CRANKSHAFTS

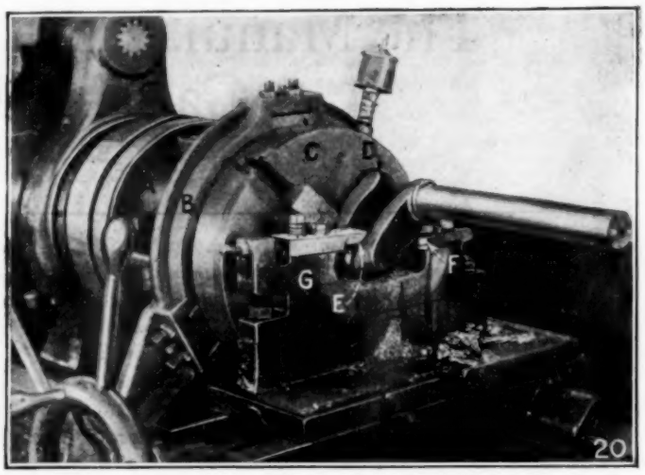


FIG. 20. SPECIAL CRANKPIN LATHE FOR SMALL SHAFTS

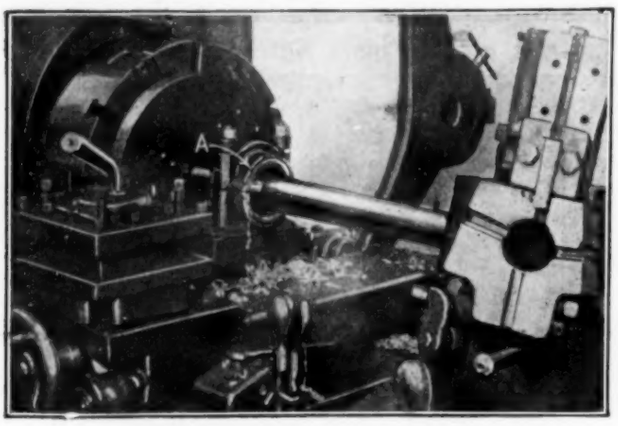


FIG. 21. BORING BEARINGS ON A TURRET LATHE

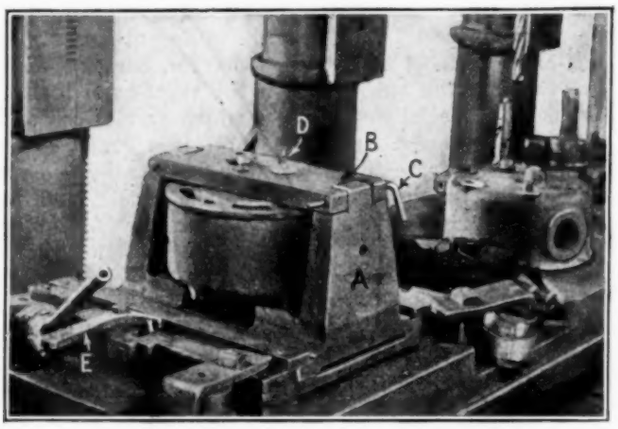


FIG. 22. SLIDING DRILL JIG FOR CYLINDER HEADS

the throw of different cranks. The turning is accomplished by an overslung roughing tool *E* and a formed finishing tool *F*, which are carried on the special cross-slide *G* that is attached to the special lathe carriage.

Satisfactory results in point of accuracy and finish have been obtained and it has not been found necessary to grind the cranks after the finishing cut.

Fig. 21 shows the manner in which the brass- and babbitt-lined bearing blocks *A* of the larger engines are bored and reamed by suitable tools carried in the turret head of a Gisholt turret lathe.

The cylinder heads are machined in a turret lathe and are then transferred to a gang drilling machine, Fig. 22, for the various operations of drilling the valve and cap bolt holes. The drill jig *A*, somewhat similar to the one used on the connecting-rod job, is provided with a hinged bushing plate *B*, which is held in place by the locking pin *C*. The drill is guided by the bushing *D*, and the jig located in drilling position by means of the spring-actuated stops *E*.

GRINDING THE VALVES

The grinding of the valve seats in the cylinder heads is accomplished by a special valve-grinding

FIG. 24. GROUP ASSEMBLY FOR ENGINES

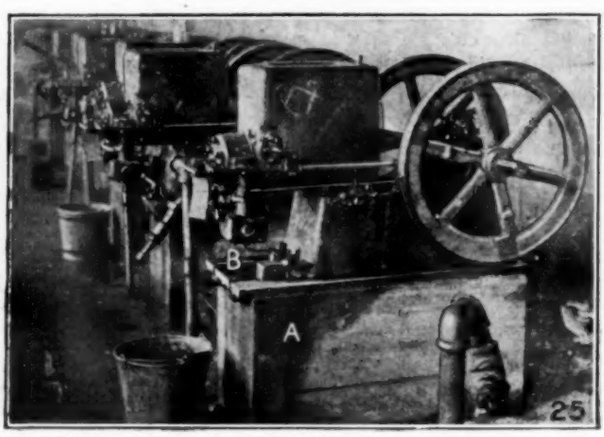


FIG. 25. TESTING THE COMPLETED ENGINES

machine, Fig. 23, which was designed and built in this shop. This work is expedited by handling three cylinder heads and grinding the two valves contained in each head in the same set-up. The cylinder heads *A* are mounted on suitable wood blocks *B* and at the position *C* both grinding spindles are in position and ready for operation. At *D* one spindle is in place and the other one is in position for the removal of the work. The spindles are raised or lowered by means of the lever *E*. The valve heads are slotted to take the screwdriver bits which transmit the rotary reversing motion of the spindles during the grinding operation. This motion is obtained by means of a reciprocating rack and gear drive mounted behind the guard *F* and operated by a crank which is connected to a belt-driven gear inclosed in the housing *G*. The rack reciprocates rapidly and practically gives the spindles a complete revolution in each direction. While this motion is being given to the valves, a worm gear driven by the belt *H* slowly revolves the camshaft *I*. Cams on this shaft operate the plungers *J* which lift the valves momentarily from their seats in the cylinder head, thus eliminating the possibility of having grooved and leaking valves.

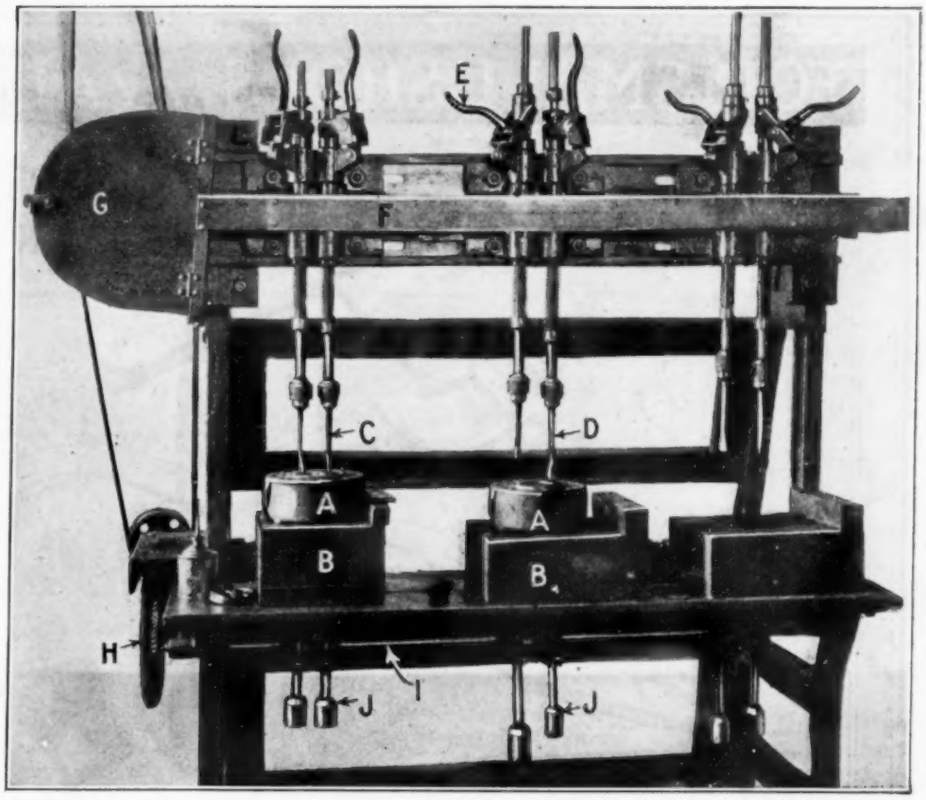


FIG. 23. MACHINE FOR GRINDING VALVES

Fig. 24 shows a row of engine beds of the same type mounted on work benches in the assembling room. In assembling, the assemblers pass from one unit to another, performing on each a single operation of a sequence through the entire lot before passing on to the next operation.

The Final Test

A foundation, Fig. 25, is provided for mounting the engines in the testing room. This consists of a monolithic concrete block *A*, upon the top of which is mounted a cast-iron bed *B*, which is provided with T-slots. The engines on test are connected to an underground exhaust system which keeps the air of the testing room clear and free from the products of combustion and in proper condition for the health of the employees.

Through Trade Routes Essential to Foreign Trade

"Three kinds of transportation are now required by our foreign trade," said R. M. Calkins, vice-president of the C. M. & St. P. Ry., in addressing the Foreign Trade Convention at San Francisco, May 12. "The transportation of thought by wire or wireless; the transportation of communications and statements by letter, and the transportation of passengers and cargo by railroad and steamship lines; and the best results can only be obtained by the unification of all three into prompt, regular and dependable service.

"It seems to me that the simple and yet indispensable things in connection with the building up of our foreign commerce have been given the least attention of all. In the first place, the American citizen, in spite of the vast mileage included in his own country, is usually alarmed by great distances.

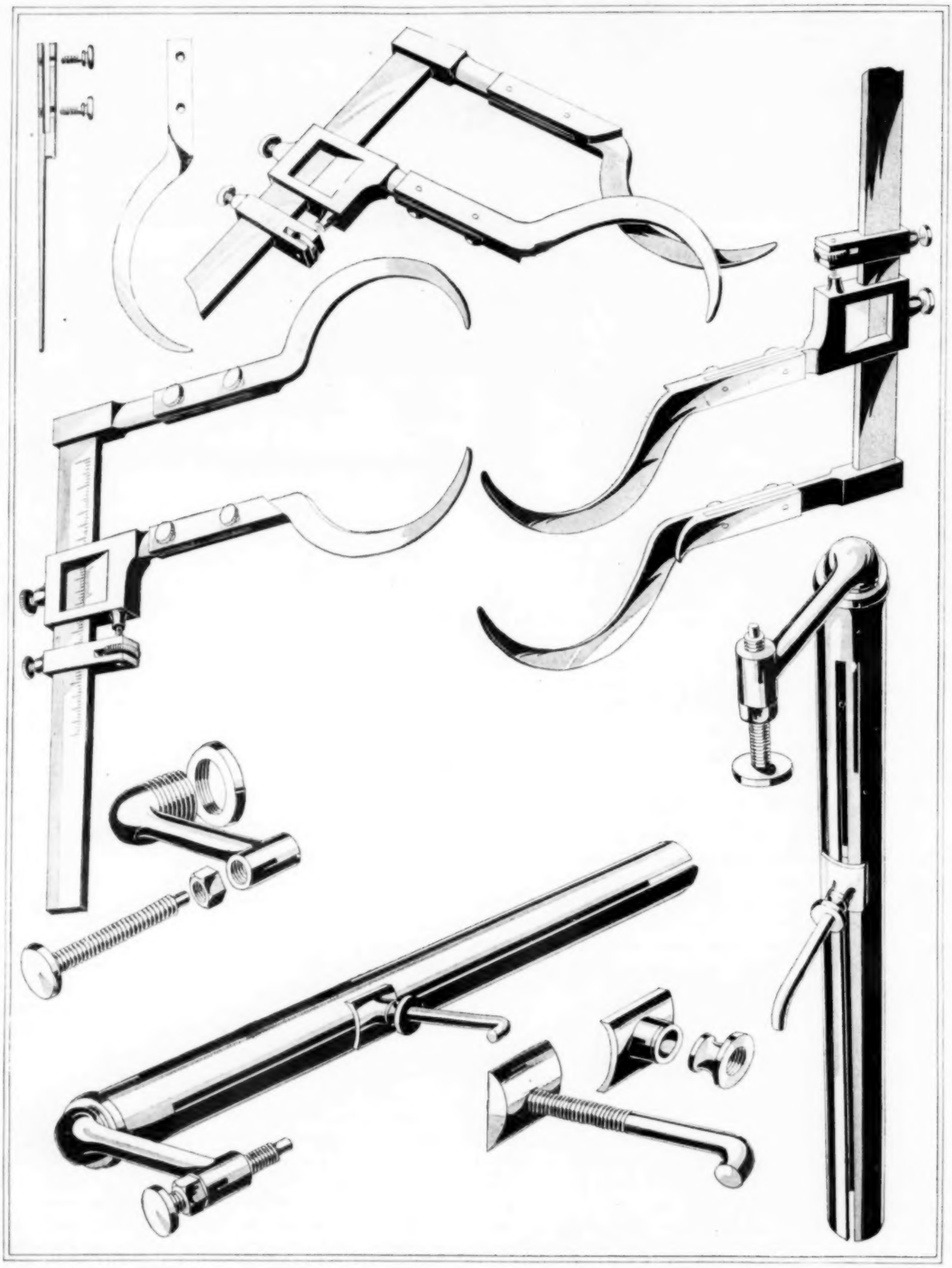
"When transportation and communication shall have been established on all well-known trade routes, advertised thoroughly through the various channels open to the organization operating over these trade routes, the buyer and seller of raw material or manufactured article will in the natural course of business be promptly brought together.

"In mapping out and establishing the through trade routes, they should be closely allied with the principal railway lines of the country. In fact, there should be a very close working arrangement between the railroad and the shipping interests to the end that through rates and fares between foreign ports and all principal American centers be established and published, and through bills of lading and tickets be obtainable. The wharfage or terminal charge on all through business should be uniform at all of our principal ports.

"More elasticity should be given to the adjustment of these joint water and rail rates. We must not lose sight of the fact that, in the handling of this foreign commerce, we will at all times be subjected to the keenest foreign competition with water rates which will not be subjected to regulation but will, in all likelihood, be based upon the principle of what the business will stand."

FOR SMALL SHOPS *and* ALL SHOPS

By J. A. Lucas



Problems of Industry and Trade

[Interviews with Men Who Know Conditions]

By C. W. PARK

"I HAVE no faith in artificial methods of stimulating production," said B. B. Quillen of the Cincinnati Planer Company, the other day, in discussing some of the efforts now being made to increase the output of American manufacturers. "As soon as 'production' becomes a catchword, like 'efficiency' or 'the high cost of living,' look out for it. The production of talk is about all that will result. Somebody will start a 'movement,' or make an investigation, or adopt a set of resolutions, and there the matter will end. We can't depend on enthusiasm alone to work ourselves up to a high pitch of production, and even if we could, it would not mean a healthy industrial condition, or a solid foundation on which to build for the future."

"What do you consider the *natural* means of increasing production?" Mr. Quillen was asked.

"Opportunity for the individual. The individual firm under free competition, and the individual employee under free working conditions, will be sure to increase their output. They will do this, not because more production is a fad or a slogan, but because it is to their advantage. The only things that hinder maximum production are those that interfere with the legitimate ambition of the firm or the workman for increased earnings. By 'earnings,' of course, I mean something fairly earned, and not mere income or profit.

An Interview With B. B. Quillen

B. B. QUILLEN

Changes in the circumstances influencing production are so rapid that they cannot be reduced to a rigid classification. The historian of the reconstruction period may write an interesting story later, when all the evidence is in. Just now, the most significant facts and the most helpful suggestions come direct from the men who are engaged in actual production day by day. These men are too busy making industrial history to comment at length, but what they have to say is well worth reading. From time to time the "American Machinist" will publish interviews with prominent manufacturers and others on subjects of current interest.

Factors Which Discourage Larger Outputs

"Just now there are a good many factors which discourage a larger output. One trouble is a shortage of labor, both skilled and unskilled. In the machine tool industry we need to develop a larger force of trained workmen. An improved apprentice system will help, especially where it can be combined with a continuation school. In plants employing 250 or more, the vestibule school affords the best means of training skilled workers. If working conditions are favorable, a large proportion of the men trained will become permanent employees. On those who go elsewhere, the time will not have been wasted, for we owe it to the industry to train new men. Also, it should not be forgotten that a man who has learned to operate a certain type of machine becomes a good advertiser for it."

"Where will you get the unskilled labor?"

"Personally, I am in favor of encouraging desirable immigrants to come to this country as fast as they can safely be absorbed. This will insure a steady supply of labor, now much needed for construction, manufacturing, agriculture, and many other purposes."

"How much this influx of foreigners affect the American worker?" was another question asked.

"It would gradually raise him to higher levels of skill, responsibility and earning power; that is, if he had the ambition and ability to work ahead. If he hadn't, his position would at least be no worse.

"Besides the shortage of labor, a big hindrance to production just now is the widespread unrest. This is not confined to industry, but affects business and other interests at the same time. In part, too, the unrest is caused by underproduction and the consequent rise in prices. This situation creates a vicious cycle, with underproduction causing unrest, and unrest cutting down production.

"Although in this sense the restless attitude of labor is part of a general condition, there is no doubt that in many instances the main trouble has been the outside agitator. In so far as he is able to persuade some men that their employer is their natural enemy, he succeeds in slowing down production. His followers are usually a small minority, and are likely to be well organized and capable of embarrassing the loyal majority. Anyway, destructive activity is easier than constructive."

"What would you suggest as the best means of improving industrial conditions?"

Bonus System Helps

"I haven't any patented remedy. For one thing, we must distinguish between the present highly abnormal situation and the general question of justice between employer and employee. A permanent labor policy must include for one thing some means of giving every worker a direct interest in production. The bonus system seems to me the best plan yet devised for handling this problem in the shop. For the office force, including all employees holding responsible positions, I believe an extra reward based on the firm's output for a given period should be paid. This is what I meant awhile ago by individual opportunity. It emphasizes the employee's interest in the firm, to the mutual benefit of both. I don't know what the details of the best solution for the labor problem will be, but I feel sure that one of the most important principles will be that which guarantees the worker a right to profit in proportion to his individual skill and effort."

Oil-Electric Propulsion for Vessels

The yacht "Elfay"—the first yacht to be driven by the Diesel electric system of propulsion—left New London Jan. 15 for Cuba, Bermuda, and other Southern ports.

This vessel, originally the "Katoura," was built by Herreshoff in 1914. She is essentially a sailing schooner, 152 ft. over all, 30 ft. beam, and 313 tons gross. Her present owner, desiring to install auxiliary propelling apparatus, decided on the most modern variety. Her propelling equipment consists of a 6-cylinder 115-hp., model 54 Winton-Diesel oil engine direct connected to a 75-kw. Westinghouse generator. This supplies power to a 90-hp. Westinghouse motor, of 360 r.p.m., direct connected to the propeller.

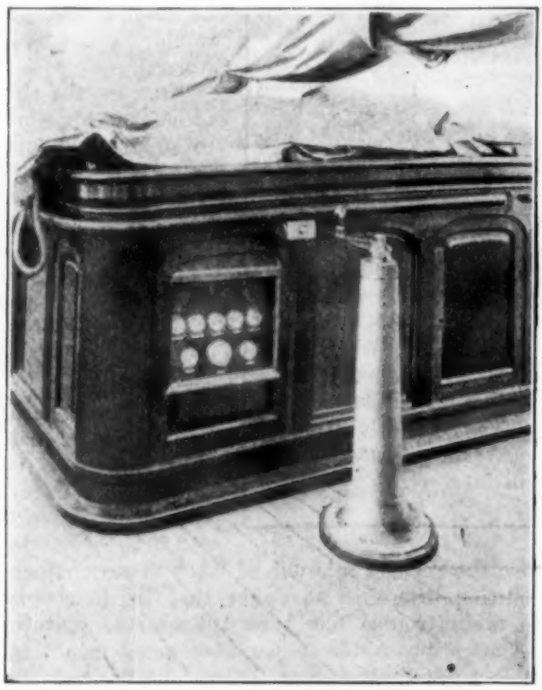


FIG. 1. THE DECK CONTROL

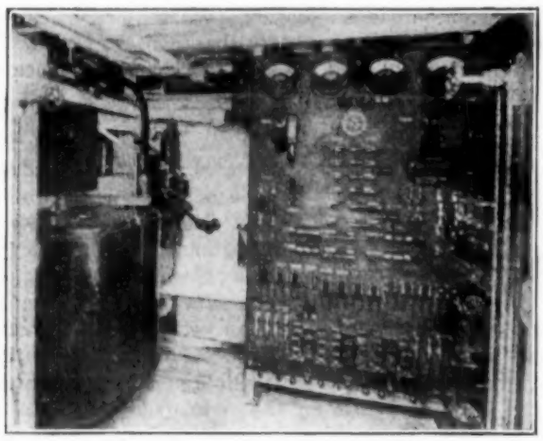


FIG. 2. THE SWITCHBOARD

The control of this motor is centered in a single handle located on the deck. By turning this handle in one direction, the propeller motor is started from rest and brought through several steps up to full speed ahead. By turning the control handle in the reverse direction, the motor is reversed in a similar manner, and the change from full speed ahead to full speed astern can be effected in 5 sec. There are no signals to the engine room and the officer in charge has full control of the propelling equipment. A set of meters

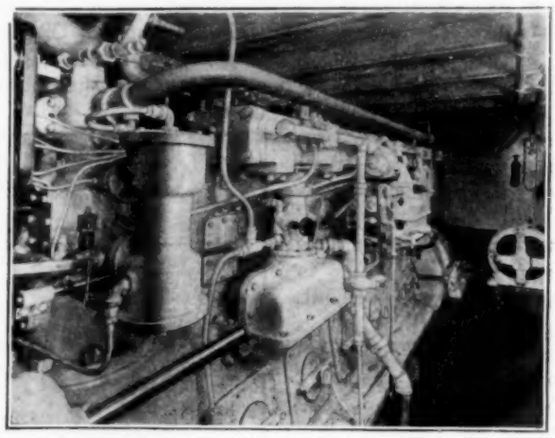


FIG. 3. THE WINTON-DIESEL ENGINE

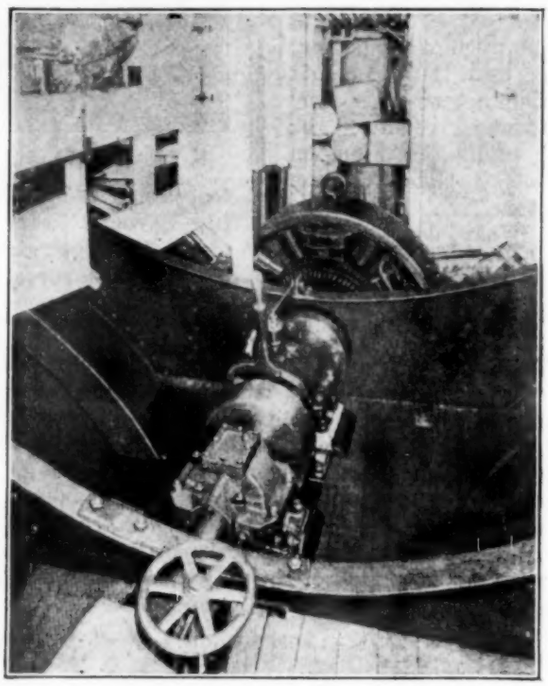


FIG. 4. CLUTCH CONNECTING MOTOR AND PROPELLER SHAFT

gives the navigator full information as to the performance of the machinery.

This simplicity of control is due to the fact that the controller handles neither the main engine nor the main motor current, but only the small generator-field current. The engine itself is operated from the engine room, but is merely kept going at normal speed in one direction only.

All of the auxiliary equipment of the "Elfay" is electrically operated, including the winches, pumps, fans, blowers, ice machines, etc. She is also electrically heated, but cooking is done by an oil range supplied with electrically pumped oil.

The "Elfay" will depend mainly on her sails, but she has a cruising radius of 2,000 miles on her motor

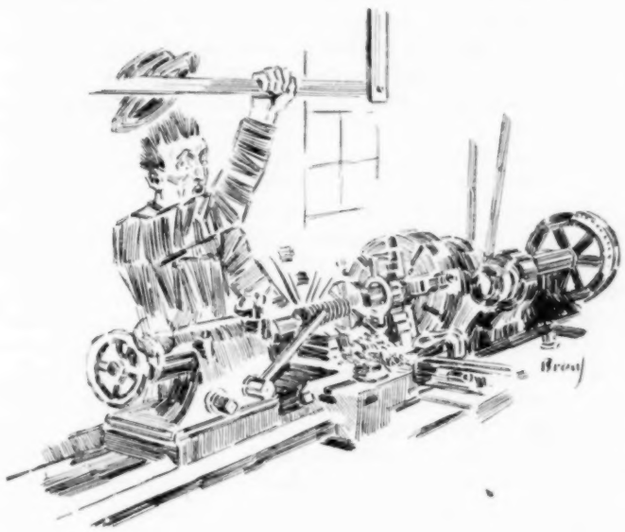
drive, since she can carry 2,400 gal. of fuel oil and consumes 7½ gal. per hour. Her speed at the full power of the motor is 8½ knots.

Which Side Do You Stand On?

By F. M. A'Hearn

Answering the above question, which was raised by Sandy Copeland on page 1064, Vol. 51, of the *American Machinist*, it is the belief of the writer that the operator stands at the right side of a planer when operating it, and that the operating side is commonly recognized as the right side.

Some of the older makes of planers were operated



from the opposite side, one in particular that I have in mind was built by J. H. Gage, Nassau, N. H.

The builders of double-head lathes, such as locomotive driving wheel and car wheel lathes, usually refer to the movable head, which is to the right of the operator as he faces the machine, as the "right-hand head." The same practice seems to be followed by builders of boring and turning mills.

The crank-shaping machines leave room for arguments as two well-known machine-tool builders manufacture traverse-head crank-shaping machines commonly known as double-head shapers, having a long bed with a head operating from each end to the center or even past it, each head having its own drive and feed works entirely independent of the other and usually an operator for each end of the machine. I believe that in this case the operator who works the end of the machine to the right as he faces it operates the right side or the right end, and also believe that the single-head shaper, which I assume Mr. Copeland refers to, is operated from the right side.

A venerable lathe which the writer was once assigned to operate, had what was called in the shop, a "left-hand carriage." This tool may have been designed by an honest Christian gentleman, but it was invariably the opinion of the luckless "goat" who had it wished on him, that the machine was premeditated with malice aforethought. The handwheel of the carriage was located at the right end of the apron, bringing the cross-feed crank to the left hand of the operator. The lead screw was carefully concealed along the back of the bed which practically prevented the operator from using the half nuts when chasing a thread.

It was always a source of entertainment to see the uninitiated victim get balled up before he trained himself to the new movements required when cutting a thread, especially when it finished close to a shoulder, as an engine-lathe hand will without thought or effort go through the motions of backing the tool away from the cut and reversing the machine at the same time.

On this lathe these habitual movements would be made with the wrong hands and the show would end with frantic clawing for the shipper and all the operating handles and knobs at the same time, while the tool was "Marching Through Georgia," ruining the job and the foreman's disposition.

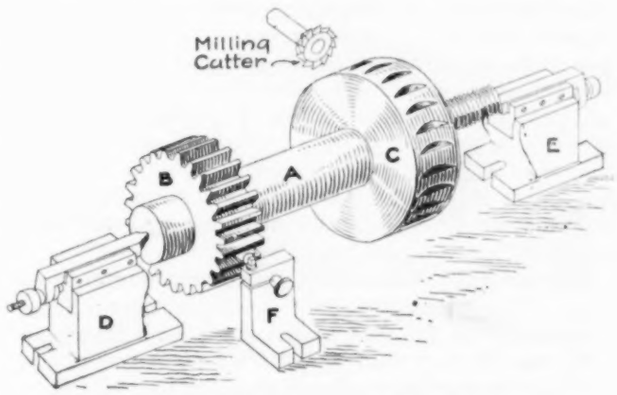
The suggestion and advice offered by near-by workmen at this stage depended on how husky the new guy looked, or didn't look, for verily sometimes "Silence is Golden."

A Simple Indexing Device

By I. B. Rich

A friend of mine who runs a small shop, recently had some accurate indexing to do in order to cut a number of pockets in a brass casting. These had to be accurately spaced on account of the necessity for securing as perfect balance as possible in the completed instrument. In order to avoid the possibility of backlash in the indexing head, he rigged up the following simple device on a plain milling machine. Turning up an accurate mandrel *A*, he made substantial centers in both ends and fastened an accurately cut 24-tooth gear at *B*.

The other end was turned down true with the centers, and provided with a nut and collar for holding



A SIMPLE INDEXING DEVICE

the piece to be milled as at *C*. These were then placed between a pair of plain milling machine centers as shown at *D* and *E*. The angle plate *F* carries the index pin *G* which was carefully shaped to fit and hold the indexing gear rigidly in position while the cut was being milled in the casting. The screw *H* clamped the index pin rigidly in position at each indexing. This simple arrangement was found to be quicker than an indexing head and it also entirely avoided the possibility of incorrect indexing, as, even if the operator missed a tooth, it was only necessary to come back to it, while missing the count on an index plate might spoil the casting.

Knowing Your Insurance Policy—IV

By CHESLA C. SHERLOCK

"Honesty is the best policy" might be changed, for insurance purposes, into "Honesty produces the best policy." When both the insurer and the assured are entirely truthful in their dealings with each other an insurance policy that is capable of giving real protection is nearly certain to result. The differences between representations and warranties in insurance policies are not generally understood. What the law in different states has held regarding these matters is carefully treated in this discussion, quotations from many decisions being used to develop the thought.

(Part III was published in our May 20 issue.)

Representation and Warranties

THE effect of representations and warranties or their breach upon the contract of insurance is a matter of utmost importance to the insured. If he makes a misrepresentation in order to secure an insurance policy, or assents to a warranty which is incorporated into the policy and then is guilty of noncompliance with it, what effect will this have upon the contract and the rights thereunder?

There has always been more or less confusion as to the meaning of the terms "representation" and "warranty" and the distinction between the two. Some are of the opinion that they are one and the same thing, while others confess that they haven't the slightest idea as to what they mean. No one need be ashamed of himself on this score, for a great many of the courts confuse the terms at times and seem to have only a meager idea as to the real meaning of them.

Joyce defines a representation as "an oral or written statement which precedes the contract of insurance, and is no part thereof, unless it be otherwise stipulated, made by the assured or his authorized agent to the underwriter or his authorized agent, and relates to facts necessary to enable the underwriter to form his judgment whether he will accept the risk and at what premium."

The same authority defines an express warranty as follows: "An express warranty is a particular stipulation inserted on the face of the policy or clearly embodied therein as a part thereof by proper words of reference whereby the assured agrees that certain facts are or shall be true, or that certain acts have been or shall be done, and upon the literal truth or exact fulfilment of which stipulation concerning the same the validity of the contract depends. . . . A warranty may relate to the past, present, or future, or each or all."

Chief Difference Between Representation and Warranty

One can readily see that there is a big distinction between representations and warranties. The one is not a part of the contract but relates to facts and circumstances arising at the time the contract is proposed, while the other is an express part of the contract and usually a condition precedent to the contract itself and the liability of the insurer.

McArthur draws this distinction between the two: "A representation differs from an express warranty in this respect, viz.: That the former does not and the latter does, appear in the policy. A statement which, if collateral to the policy only amounts to a representation, acquires the force of a warranty if inserted in the instrument."

Ellis, another authority, states: "There is a material difference between a representation and a warranty; a warranty is always a part of the written policy, and must appear upon the face of it; but a representation is only a matter of collateral information on the subject of the insurance, and makes no part of the policy. A warranty must be strictly and literally complied with; but it is sufficient if a representation be substantially correct."

In an Oklahoma case, it was pointed out that fraud is the ground upon which a contract is made void by a misrepresentation while noncompliance with a warranty operates as an express breach of the contract.

Another authority points out the instances when a representation is material to the contract: "A representation in insurance is in the nature of a collateral contract, either by writing or not inserted in the policy or by parol, and is a communication of facts and circumstances relative to the insurance made to the underwriters, with a view to enable them to estimate the risk and calculate the premium to be paid. A representation is said to be material when it communicates any fact or circumstance that may be reasonably supposed to influence the judgment of the underwriters in undertaking the risk or calculating the premium, and whatever may be the form of expression used by the insured or his agent in making a representation, if it have the effect of imposing upon or misleading the underwriter, it will be material and fatal to the contract."

Material Facts in the Contract

The United States Supreme Court has said that to constitute a representation there should be an affirmation, or denial of some fact, or an allegation which would plainly lead the mind to the same conclusion.

The point to be made here is that the person seeking insurance should be most careful as to the statements or representations that he makes. If they are as to matters irrelevant to the life of the contract they will not invalidate it, but if they are as to matters which are material to the contract and the risk which the insurer is about to assume, they will certainly invalidate the contract of insurance and the assured is in the position of having talked himself out of court by his failure to adhere to the facts.

Where the representation is substantially correct and it is not to be deemed as a part of the expressed contract, it will have no effect upon the policy, but where it is stipulated as a part of the contract, it becomes a warranty and it must be literally true, or literally complied with, if the assured is to hold the insurer to the policy.

A representation may be either oral or written, but it is not a part of the policy; a warranty is always written and it is a part of the policy itself, and must be written

on the face thereof, or attached to a part of the policy and a specific reference made to it in the policy itself.

A representation *per se* is always collateral to the contract and is not of the essence of the contract. Flanders, in his work on Fire Insurance, states: "A representation precedes the contract of insurance, and is not a part of it. . . . A warranty is a part of the contract, and must be exactly and literally fulfilled. . . . A warranty is a binding agreement that the facts stated are true. The assured by his warranty engages that whatever may be the condition of things when he makes his application, the facts shall be as warranted when the policy attaches."

Misrepresentation of a Material Fact

In a New York case, the following was brought out: "In an application and a policy the statements of the assured were declared to be warranties and the basis of the contract, but in other parts of the application it was stated, in substance, that nothing but fraud or intentional mis-statements would void the policy, and that payment of the sum assured would be contested only in case of fraud. It was held that the statements were not to be regarded as warranties, and that to sustain a defense to an action on the policy, the defendant must show that not only the statements were untrue, but that they were known to the insured so to be, and that they were made intentionally and with a fraudulent design."

As to when the misrepresentation is material so as to invalidate the contract, there is a well-defined test at law. It has been said that it must be of a fact material to the risk. But this is not always the case.

Joyce points out the true test in the following words: "While it is true that a misrepresentation will avoid the policy if it is of a fact actually material to the risk, it is not true that it must be material to the risk as such in all cases. It need not actually have any bearing upon the state or condition of the subject matter. The rule already given as to what constitutes a material fact in cases of concealment is generally applicable here. The question is, did the fact or circumstance represented or misrepresented operate to induce the insurer to accept the risk or to accept it at a less premium? If it offers a false inducement which is acted upon in either case, the insurer being misled or deceived, the representation is material."

The test, then, is: Did the misrepresentation deceive or mislead the insurer? We think that this is the true statement of the rule of law, although the fact that a representation is to a fact material to the risk will not hold the assured blameless if it is untrue.

Importance of Truth in All Statements

Those seeking insurance should learn that in making statements, even where they are merely representations, that the truth is none too good. Protection is the outstanding aim of insurance and it is with the idea of securing protection that people seek insurance contracts. They cannot hope to secure protection by fraud and deceit, for the law recognizes the right of the insurer to protection from fraud and deceit. Unless the person seeking insurance can act in good faith and without an intent to take advantage of the other by concealment or fraud, he has no more protection than he had before he induced the insurer to accept the risk. The mere fact that one has an insurance policy is not, in all cases, evidence of protection. The insurance contract is a mutual agreement and there are liabilities imposed upon the person seeking insurance just as there are rights acquired against the other party where the contract is valid and binding.

A representation that is based upon expectation, belief or opinion is not material to the risk and it cannot affect the validity of the agreement. Where the representation is as to facts which are material, and it is false, but is not relied upon by the insurer, it is not sufficient to avoid the policy. The test is whether it misled the insurer and not as to the actual fact of its falsity or mis-statement of facts.

If the insurer asks questions in the blank application form and states that they are material questions, the rule will be rigidly enforced. In one case, the court said: "Nothing can be more reasonable than that the parties entering into the contract should determine for themselves what they think to be material, and if they choose to do so, to stipulate that unless the assured shall answer a question accurately, the policy or contract which they are entering into shall be void, it is perfectly open to them to do so, and this false answer will then avoid the policy."

Rulings on Misrepresentations

Many of the states have by express legislation sought to break down the distinction between representations and warranties. In Massachusetts, the civil code provides: "No written or oral misrepresentation of warranty therein made, in the negotiation of a contract or policy of life insurance, or in the application therefor or proof of loss thereunder, shall defeat or void the policy, or prevent its attaching, unless such misrepresentation is made with actual intent to deceive, or unless the matter misrepresented increases the risk of loss."

In Connecticut, it is provided that "In all policies of insurance against loss by fire, made by companies chartered by or doing business in this state, no condition shall be valid unless stated in the body of the policy." And elsewhere, the statute states that "no statement made by the applicant for insurance not included therein shall avoid the policy or be used in any legal proceeding hereunder."

In Georgia, the code provides: "Every application for insurance must be made in the utmost good faith, and the representations contained in such application are considered as covenanted to be true by the applicant. Any variation by which the nature of extent, or character of the risk is changed will void the policy."

Again, the same statute states: "Any verbal or written representation of the facts by the assured to induce the acceptance of the risk, if material, must be true, or the policy is void. If, however, the party has no knowledge but states on the representation of others, bona fide, and so informs the insurer, the falsity of the information does not void the policy."

And again the statute in Georgia provides: "A failure to state a material fact if not done fraudulently, does not void; but the wilful concealment of such fact which would enhance the risk, will void the policy."

In Kansas, the statute provides: "No oral or written misrepresentation made by the assured or in his behalf, in the negotiation of insurance, shall be deemed material or defeat or void the policy or prevent its attaching, unless made with intent to deceive and defraud, or unless the matter misrepresented increases the risk."

In Kentucky, a statute which has been in force since 1874, reads: "All statements or descriptions in any application for a policy of insurance shall be deemed and held representations and not warranties; nor shall any misrepresentations, unless material or fraudulent, prevent a recovery on the policy."

The Louisiana Statute

In Louisiana, the statute provides: "All statements purporting to be made by the insured shall in the absence of fraud be deemed representations and not warranties. Any waiver of this section shall be void."

In Massachusetts, the court said: "But it has been decided by this court that the statute was only declaratory of the common law as to representations, but that it changed the rule as to warranties by putting them in the same category as mere representations."

In Missouri, the statute provides: "The warranty of any fact or condition hereinafter incorporated in or made a part of any fire, tornado or cyclone policy of insurance purporting to be made or assented to by assured which shall not materially affect the risk insured against, shall be deemed, taken and construed as representations only in all suits at law or in equity brought upon such policy in any of the courts of this state."

Flexibility of the Law on Warranties

The effect, as we have seen, from this quotation from representative statutes and authorities, is to prevent the insurer hiding behind any iron-clad conditions which are not strictly material to the risk or to the amount of the premium paid.

It is needless to say that there are many instances in the earlier insurance decisions where the insurer escaped his obvious liability by means of a technicality grounding in the law of warranties and representations. If the assured has been charged guilty of fraud and concealment, the insurer was equally apt and disposed to take advantage of the other party when it was to his interest to do so.

The statutes have attempted to correct this abuse of the law by lowering the bars in regard to representations and warranties just so far as they could consistently do so and still maintain justice between the parties.

Conclusion

It is well settled now, both in the statutes and in the expressions of the courts, that unless a warranty is material to the risk or to the amount of premium paid that its mis-statement will not avoid the policy any more than a mere misrepresentation will.

As we have noted in this discussion, a misrepresentation will not ordinarily void the policy unless it served to mislead the insurer and unless he acted upon it in accepting the risk. Representations which are false do not affect the policy unless they were taken to be true by the insurer and were acted upon with that thought in mind.

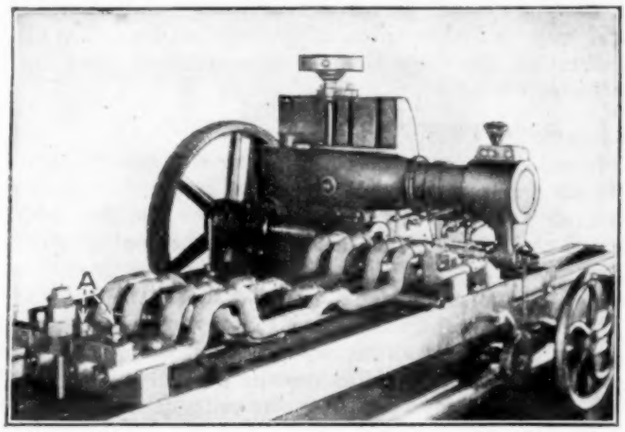
The House on the Sand

The foundations were laid by Ignorance, the bricks were cemented with blood by Carelessness, the supports were installed by Recklessness, and the decorations were by Thoughtlessness. Do you live in this house? asks the National Safety Council.

Milling Keyseats in Separator Crankshafts

By J. H. Vincent

The method used in the plant of the Minneapolis Threshing Machine Co. for milling the keyseats in their separator crankshafts is shown in the accompanying illustration. Four shafts are keyseated at a time and



MILLING KEYSEATS IN SEPARATOR CRANKSHAFTS

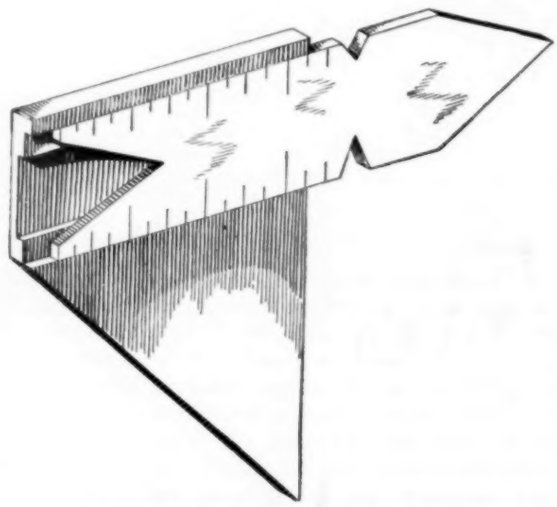
are supported at both ends in V-blocks and clamped down by crossbars which carry equalizing screws at *A*. The arbor carries four high-speed cutters which are run with a small amount of coolant. After cutting the keyseats in one end the cranks are transposed and keyseats are cut in the other end.

No special care is required in determining the position of the cut.

Attachment to Center Gage

By Roy F. Leighto

A handy little adjustment to the center gage is shown in the accompanying illustration. It can be made by anybody, and its use makes it easier to grind thread



ATTACHMENT TO CENTER GAGE

tools, either straight or at an angle. It may also assist in setting thread tools in awkward places if the angles are accurately made.

Machining the Liberty Crankcase—I.

By H. A. CARHART
Mechanical Engineer, Lincoln Motor Co., Detroit, Mich.

This article contains not only interesting examples of jigs and fixtures, but data as to the cost of hand labor and some of the problems which had to be solved in the production of Liberty motors. The hand scraping of the cases alone, with the constant shifting of men, was of itself, quite a serious problem.

ONE of the first principles in the construction of airplane-engine crankcases is to have the case thoroughly scraped on the inside so as to remove every particle of sand. So much depends upon the proper and continuous functioning of an airplane motor that no chances can be taken with the possibility of sand or other loose particles getting into the bearings. The equipment of scraping tools is shown in Fig. 1, and the scraping bench in Fig 2. This bench was designed to bring the casting at the most convenient height for the operator, but, even with this assistance, only 60 per cent of the men put on this job were able to stand the work for 90 days, and only 25 per cent of the remainder could stick to it for a longer period. The extreme physical exertion required made it necessary to constantly recruit this force, and as it required from 8 to 15 days to train an operator, this became quite a problem. The output is one case every 12 hours per operator. It will be noted that in addition to the twelve scraping tools there is also a dentist's mirror and a brush to enable the operator to see and also remove loose particles in out-of-the-way places. Previous to the scraping, the fins and other projections are removed by small air chisels. Thorough inspection follows the scraping, not only to see that it is well done but to be sure that the casting will clean up at all points. Suitable inspection gages are provided for the various vital points.

The first milling operation, as shown in Fig. 3, is done on an Ingersoll milling machine, holding six fixtures on the table. These fixtures hold the crankcases in two positions; those on one side present the cylinder flanges to the fixed angular milling cutters, while those on the other side present the joint faces of the cylinder cases. The method is to load one pair of fixtures and start the machine; while the machine is at work the next pair is loaded in the same way, and finally the third pair. The work from the first pair is removed as soon as finished and the fixtures again loaded, making this an almost continuous milling operation.

The fixtures are of the open-box type of construction, each having three hardened steel pads or equalizing points upon which the case rests. An equalizing jaw at each end clamps against the side walls of the case. Thirty-seven spring plungers, well distributed, are used to support the case and flanges while being milled. A

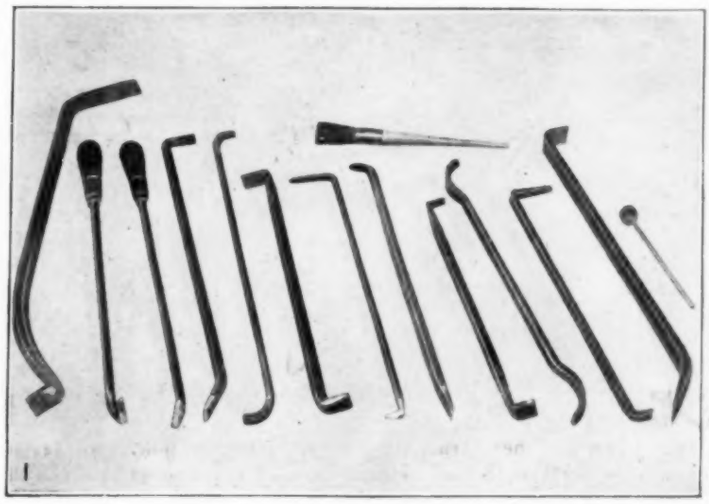


FIG. 1. THE SCRAPER'S OUTFIT

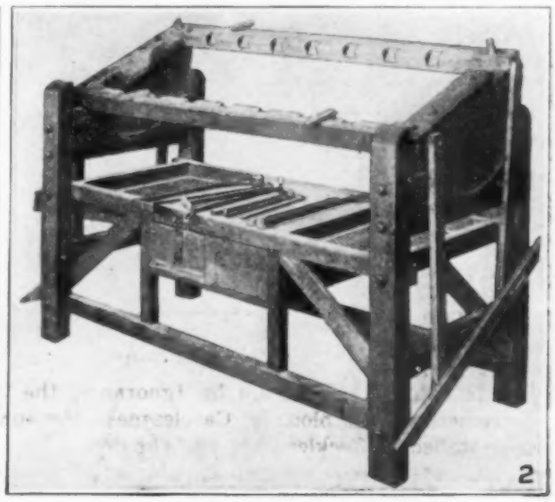


FIG. 2. THE SCRAPING BENCH

AUTOMOTIVE CONSTRUCTION

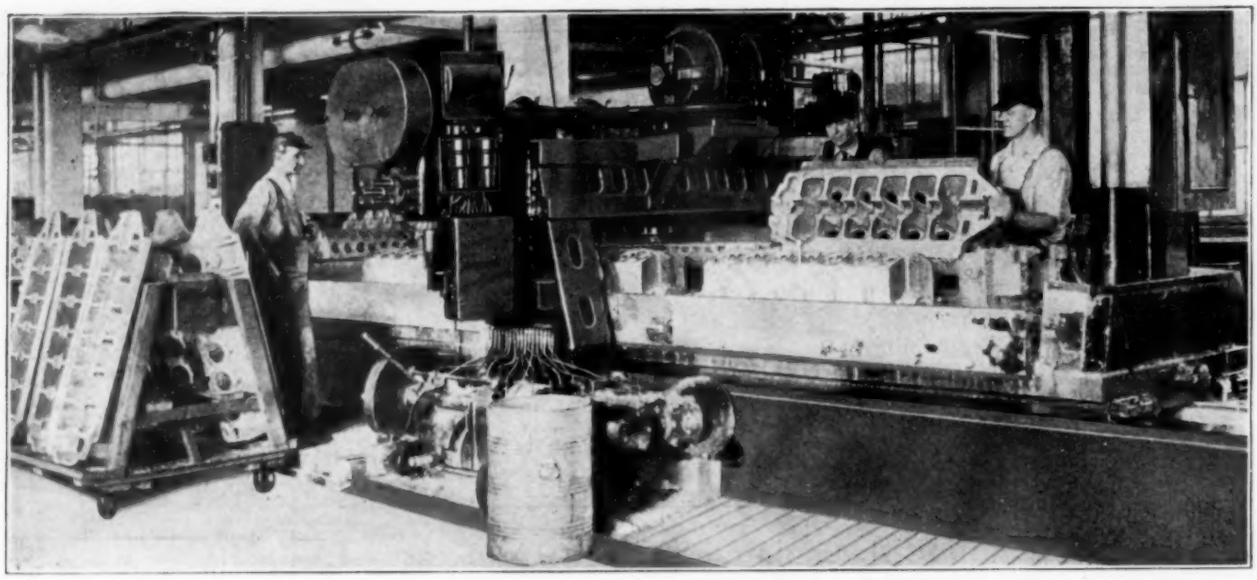


FIG. 3. MILLING THE CRANKCASE

centrally located stop screw at the rear of the fixture is used for positioning the case endwise. The case is temporarily clamped over the three equalizing points by special clamps. Then the spring plungers are released, and the case permanently clamped by four strap clamps acting against the inner cylinder walls. The temporary clamps are then removed. The other fixture on which the case is placed face down, consists of a cast-iron base having twenty-two hardened steel blocks upon which the flange rests. A centrally located pin positions the case endwise, while two hardened steel blocks on the inner side are used to locate the case sidewise, six well-distributed strap clamps holding the case in position.

Cutter Speeds and Feeds

Some of the milling data in connection with this work will be of value in other cases. The cylinder-pad facing cutters are 8 in. in diameter and have sixteen inserted high-speed steel blades. They run at 295 r.p.m. and have a feed of 14 in. per minute, removing approximately $\frac{1}{16}$ in. of metal. The cutters require regrinding approximately every eighteen pieces, which means a little oftener than once in two hours as the output is ten per hour. The lubricant is sixteen parts of water to one part of "Cutrite." The finishing cut only removes $\frac{1}{32}$ in. of stock with the cutters running 275 r.p.m. with a feed of 13 in. per minute. The difference in the amount of metal removed adds comparatively little to the life of the milling cutters, as these must be reground approximately every twenty-one cases.

After a thorough inspection the half bearings are bored on an engine lathe by the fixture and boring bar shown in Fig. 4. The case rests on six hardened-steel blocks and the boring bar is carried in four steel bushings, three of which revolve with the bar. The outer bushing remains stationary. The bar carries sixteen cutters made up of $\frac{3}{4}$-in. square steel and held in slots by means of headless setscrews. The bar has a keyway its whole length in which the keys of the three revolving bushings slide, keeping the cutters and the clearance slots in the revolving bushings always lined up. The advance cutter roughs the bore to 2.945 in. and the following cutter bores to 2.97 in. The speed of the bar is 250 r.p.m., with a feed of 0.008 in. per revolution. The cutting tools require regrinding about every sixty cases,

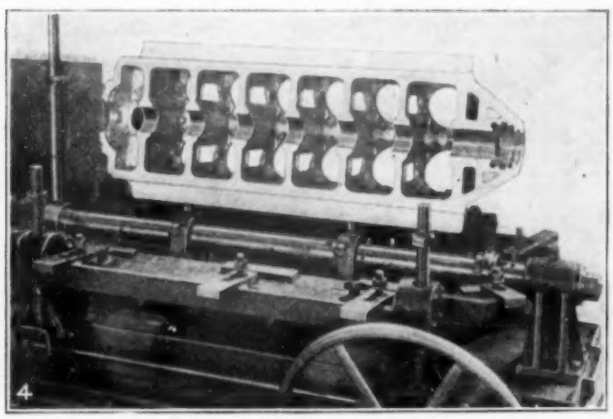


FIG. 4. BORING THE BEARINGS

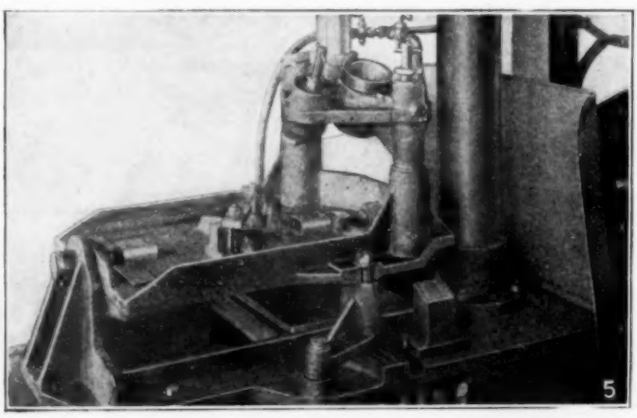


FIG. 5. BORING FIXTURE FOR CAMSHAFT DRIVES

AUTOMOTIVE CONSTRUCTION

and a single machine can handle about fifteen cases per hour. The same cooling solution is used as in milling. The finish-boring to 2.985 in. is done in a similar fixture and with similar cutters.

The holes for the generator and camshaft drive are bored in the fixture shown in Fig. 5 under a vertical drilling machine. This requires very little explanation, the end of the crankshaft being clamped in the fixture, which consists of a sub-base and two standards which act as trunnions so that it can be swung into the different positions. The crankcase is located by a pilot plunger which fits the end-cylinder bore, after which the case is clamped in position.

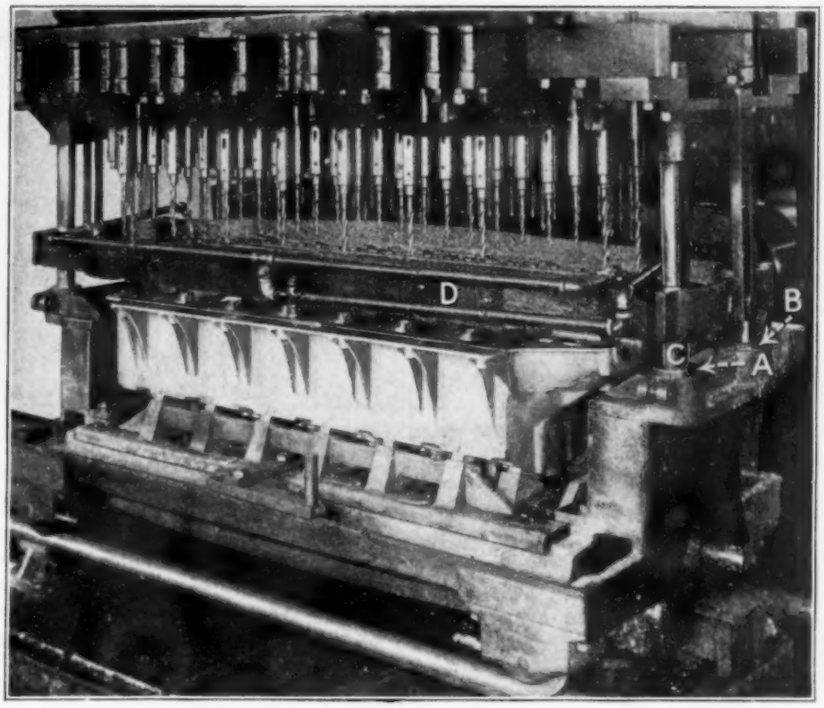


FIG. 6. DRILLING FIXTURE FOR FLANGE

The drilling fixture is shown in Fig. 6, sixty-eight spindles being utilized in this operation. There are four drilling operations which are performed on a battery of four machines by a progressive system. These machines are inclosed in a return-track system shown in Fig. 7, which consists of cold-rolled-steel shafting mounted on suitably arranged brackets. These fixtures run upon this track, being loaded at one end of the track and passing under the various machines consecutively. The fixtures are then run onto a cross-carriage at each end of the line, which transfers them back to a track in the rear of the machine, on which they can be returned to their original starting point.

Each fixture, which includes a cast-iron carriage mounted on four rollers, carries two hardened guide bushings at each end, two of these being shown at *A*

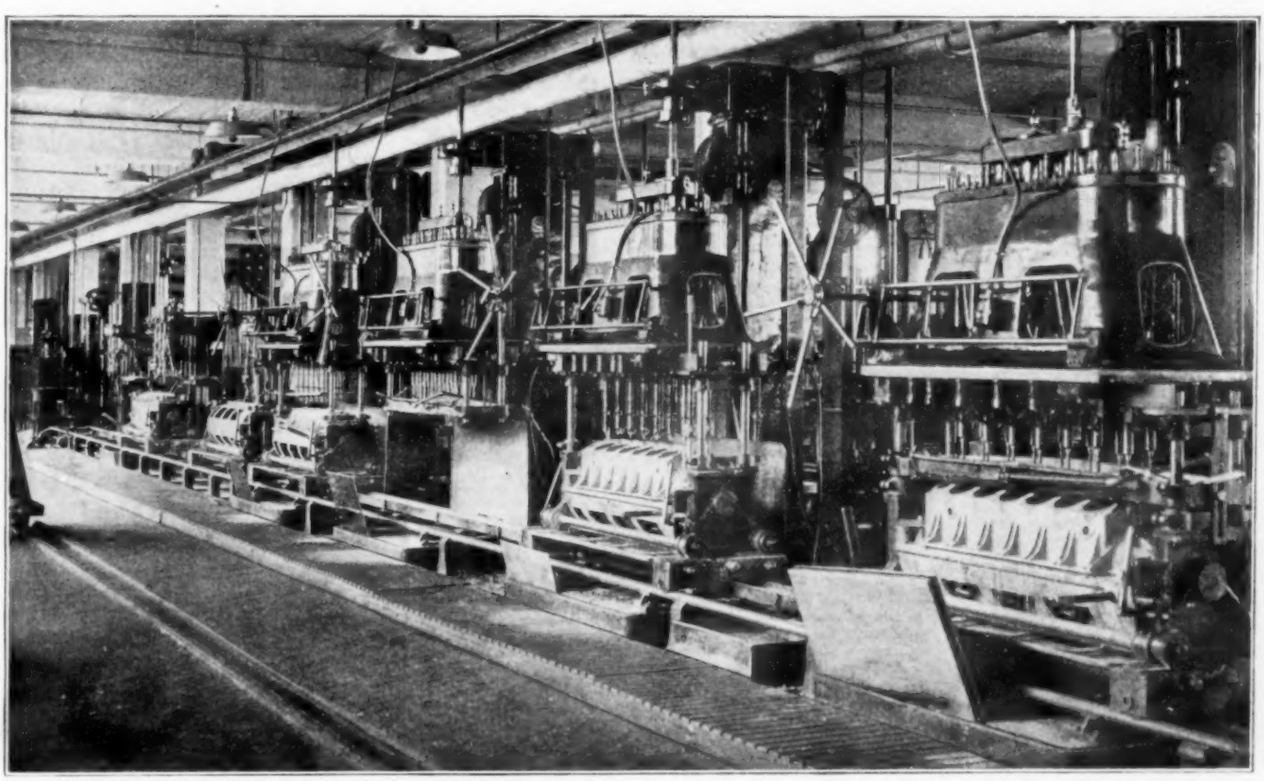


FIG. 7. THE DRILL TRACK SYSTEM

AUTOMOTIVE CONSTRUCTION

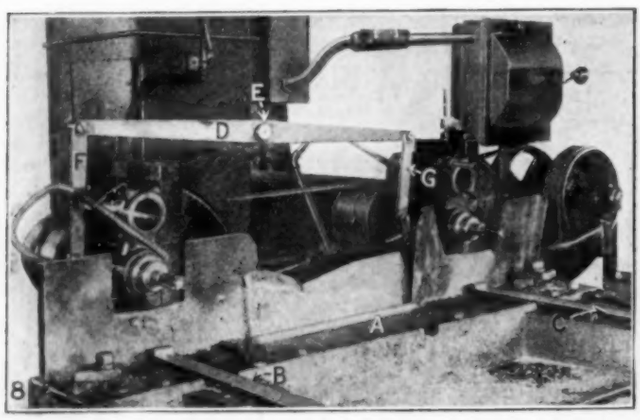


FIG. 8. DOUBLE HAND MILLING MACHINE

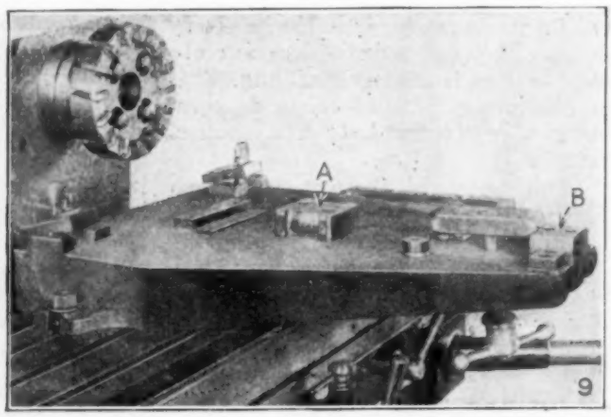


FIG. 9. FIXTURE FOR MILLING THE ENDS

and *B*, Fig. 6. After being loaded the carriage is rolled under the first machine and the head brought down slowly, allowing the pilot bar *C* to enter the guide bushing. A continued downward movement of the head leaves the guide plate *D*, carrying the drill bushings, in contact with the crankcase, and feeds the drills through the bushings and into the work. The drills vary in size from $\frac{3}{32}$ to $\frac{31}{64}$ in. and run at 1,200 r.p.m., the feed being 0.002 in. per revolution.

A Double Hand Milling-Machine Job

For milling the oil-filler pads on the side of the case, two No. 6 hand-milling machines are used in tandem by connecting the two tables with the cast-iron plate *A*, which makes them move as one unit, as shown in Fig. 8. The crankcase rests on the two hardened-steel bars *B* and *C*, the lugs at the back end positioning the sides of the case. The swinging cross-arm *D*, supported on a pin at *E* and carrying the two links *F* and *G*, raises the head and its milling cutter on one machine at the same time the other is lowered. This movement, combined with the backward and forward movement of the carriage, mills the oil filler pads.

Another type of fixture is shown in Fig. 9, which holds the crankcase while the nameplate on the synchronizer pad is being milled. This fixture locates the crankcase by means of the crankshaft bearings, which fit over the blocks *A* and *B*, the block *A* having lugs to locate the case endwise. The details of the operation itself are very apparent.

The drilling fixture shown in Fig. 10 is very similar to that illustrated in Fig. 6, the main difference being the addition of a rack and pinion for moving the base in and out under the bushing plate. This is an indexing jig so as to enable the holes for the cylinder studs to be drilled at their proper angle of 45 deg.

An unusual milling attachment is shown in Fig. 11. Owing to the lightness of the aluminum casting a large crankcase can be easily handled on a comparatively small machine, as shown. This is a hand milling machine and by making the fixture itself as light as possible it was easily able to handle the work as shown.

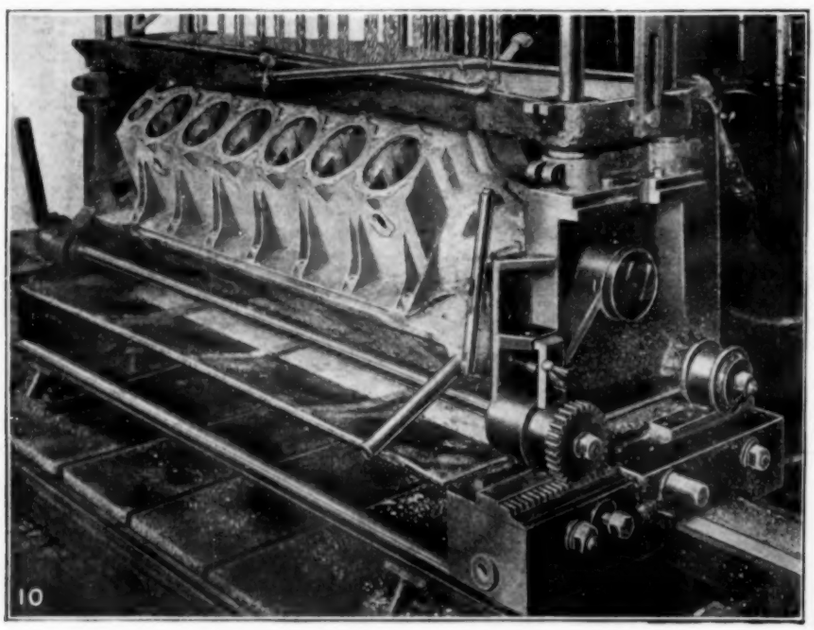


FIG. 10. DRILLING CYLINDER STUD HOLES

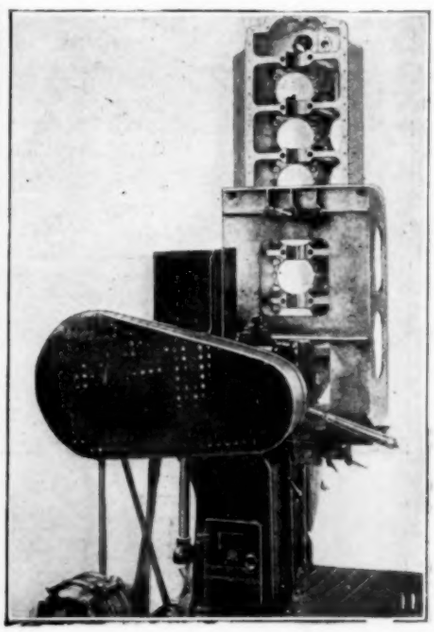


FIG. 11. UNUSUAL MILLING FIXTURE

AUTOMOTIVE CONSTRUCTION

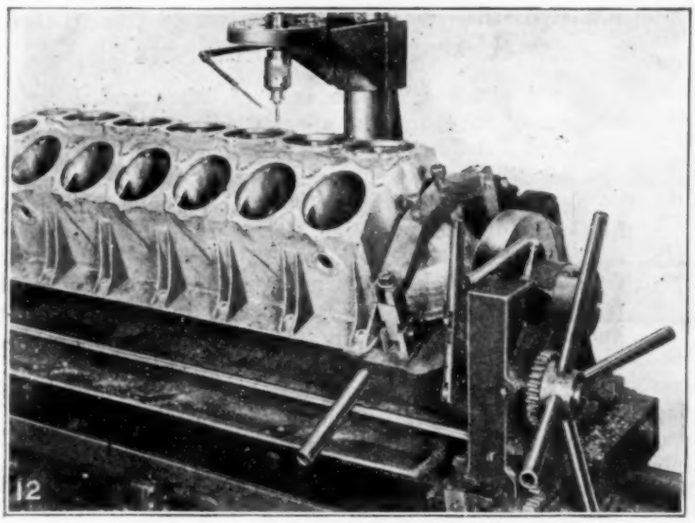


FIG. 12. FIXTURE FOR RAPID TAPPING

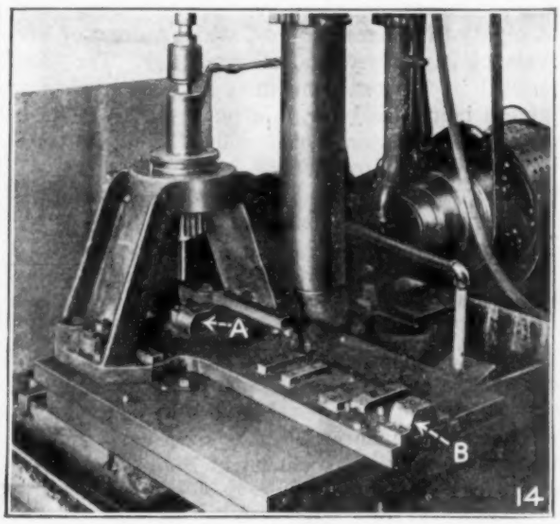


FIG. 14. BORING FOR OIL-PUMP HOLE

A convenient tapping fixture is shown in Fig. 12. The crankcase is mounted on trunnions so as to be readily swung from one position to the other, and the fixture is provided with a rack-and-pinion movement to enable the work to be moved sideways in either direction. The whole fixture is on wheels, and the rails, made of cold-rolled-steel shafting, allow it to be easily moved endwise. Details of the tap holder are shown in Fig. 13. The Oldham coupling *A* drives the floating shaft *B* which runs in the bushing *C* and drives the tap and nut. The bushing *C* is held in a spider *D*, the flange carrying a double ball bearing as shown, this ball bearing floating between the plates *EE*, which are held stationary and supported by an extension arm from the drilling-machine column.

It will be noted that there is an annular space between the hub of the spider and the plates which allows free movement in any direction. The amount of this movement, however, is limited by the play between the pin *F* and the holes in the lower plate. This device proved satisfactory and handled a large amount of tapping.

The inspection of the lower half of the Liberty motor crankcase includes a water test for leaks, a pressure of from 3 to 5 lb. being used for this purpose. It is then inspected all over to insure there being sufficient

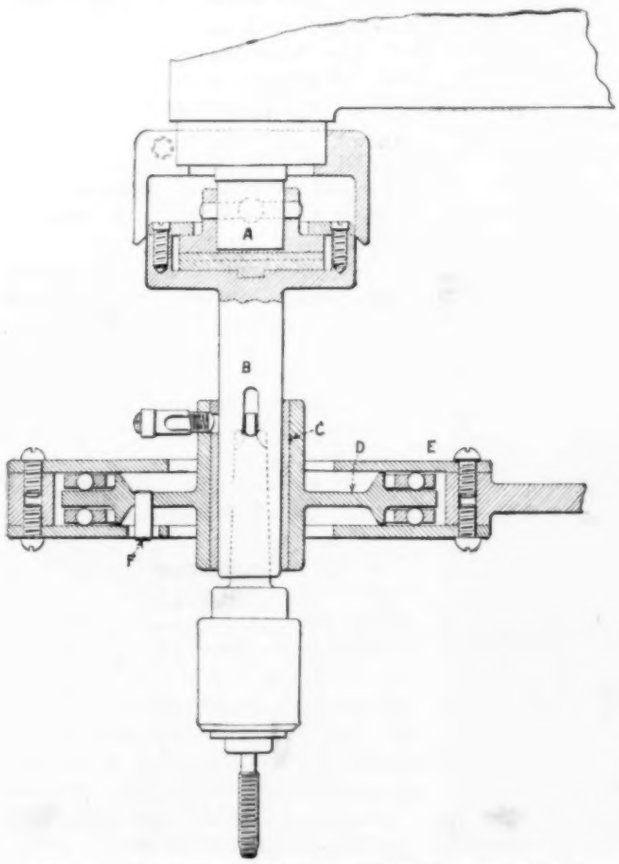


FIG. 13. FLOATING HEAD FOR TAPPING MACHINE

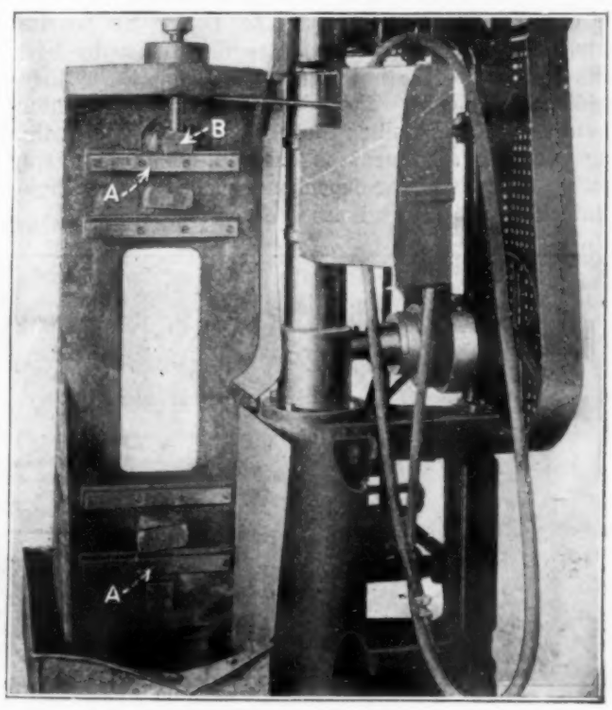


FIG. 15. BORING FOR WATER-PUMP HOLE

AUTOMOTIVE CONSTRUCTION

metal for machining at all points. Two men can water-test eighty-five cases per day, while a crew of six men can completely inspect 150 cases per day. The joint face is milled in the usual manner, fixtures having spring plungers being used for this purpose. When the first fixture is loaded the machine is started, and the second and third fixtures loaded while it is at work. The cases are, however, all removed from the fixture before reversing the table. The cutters, some of which are 9 in. in diameter, run at 235 r.p.m. with a feed of 13½ in. per minute. These cutters remove approximately ⅛ in. of stock and will usually mill twenty-four cases between grindings.

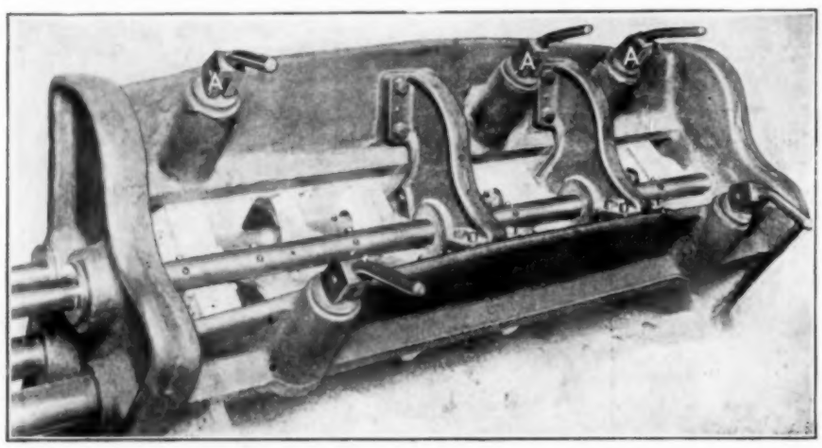
The half bearings are bored in a fixture almost identical with that shown in Fig. 4. Then after one or two minor operations the bevel-gear bearing and oil-pump hole are bored under a 25-in. sliding-head drilling machine, using the fixture shown in Fig. 14. The work is centered by means of the blocks *A* and *B*, which fit into the bearing seats. The yoke carries a heavy guide bushing for the boring tool and directly beneath is a bushing for the pilot, so as to afford a guide at both ends of the boring tool.

Another boring operation is for the water-pump hole, the fixture being shown in Fig. 15. The work rests on four hardened-steel crossbars *AA*, while at the lower end is a half-round bearing block which fits into bearing No. 7, centering the case at that end. At the upper end is a pilot *B*, which enters the bevel-gear hole previously bored. This pilot carries a hardened-steel bushing for guiding the body of the cutter by means of the pilot.

Crankcase Boring Fixture

By Frank C. Hudson

The method of boring the Franklin crankcase is to clamp the aluminum casting in the heavy fixture shown and use a single-point fly cutter for boring the bearing seats. The casting is clamped to the fixture by hook bolts operated by the cams *AA* which clamp the cylinder rigidly and quickly. The boring bars have two intermediate guides as well as those at the end, and in this way accurate alignment is insured. This is simply another example of the dependence placed on the single-point cutter when two holes are desired.



CRANKCASE BORING FIXTURE

Demountable Truck Bodies as Standard Unit Freight Containers

Recent changes in the cost of labor and labor's inefficiency have brought about conditions in the handling and distribution of freight which make imperative the adoption of economies. As a solution to the problem of bettering these conditions, Calvin Tomkins, president of the Material Machinery Manufacturers' Association of New York, N. Y., suggests the use of demountable truck bodies as standard unit containers for interchange between flat cars, auto trucks, warehouses and water carriers. The following is an extract from his paper:

There are many good freight-handling machines, tractors, trailers, micro-elevators, belt conveying machines, hoists, cranes, tiering machines, the efficiency and more universal use of which is being retarded by the lack of standardized unit containers. Successful handling of uniform packages is accomplished at New Orleans (where the best handling of freight in this country is done) by machinery, but little has been done to facilitate the handling of packages varying in size, form, weight, strength, construction and character of contents.

The Motor Terminals Co. service, at Cincinnati, now uses the demountable truck body for railroad transfer service between terminals, where it has been demonstrated that the necessary organization of terminals will be neither complicated nor expensive.

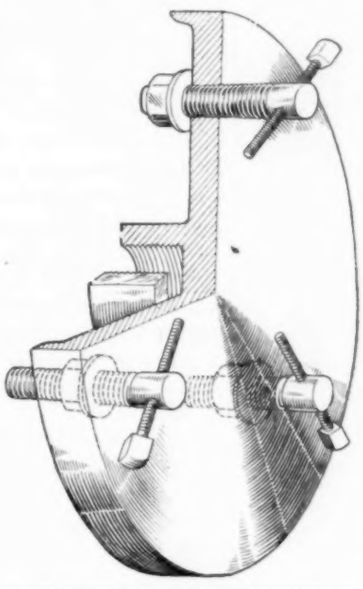
Labor costs of handling such standardized unit containers will represent a very small part of the present outlay necessary for the handling of miscellaneous package freight. The importance of minimizing the effect of a labor shortage for this work is self-evident when it is known that the scarcity, inefficiency and high cost of manual labor have caused the suspension of numerous coastwise services and threatened the future successful conduct of the Erie Canal, Mississippi River and the Great Lakes Services.

The standard container proposed is a demountable closed auto truck body, which can be readily transferred by cranes between railroad flat cars, auto chassis, warehouse floors and vessels. They should be designed so that they can be stacked on flat cars, should be weather-proof and should be arranged to contain smaller unit packages. A method would have to be devised to mark and efficiently handle the less-than-car-load and less-than-container-load shipments. Such materials as cement, sand, etc., could be loaded at the factory directly into the container and transferred directly to the point of use. Among the results of the use of unit containers such as suggested, in addition to the direct saving on handling, would be the elimination of the use of many kinds of packages such as bags, barrels, boxes and crates, and the partial elimination of the inconvenient box-car.

Adjustable Studs for the Lathe Faceplate

By H. H. Parker

The sketch shows a modification of the usual form of studs that are used for holding irregular shaped work to the lathe faceplate. They are threaded and holes are tapped into the faceplate, into which they are screwed. Locknuts and washers are provided, either at the back or the front of the faceplate, depending upon the position and shape of the work. This arrangement allows the clamping screws to be located at varying distance from the faceplate by screwing the studs in or out and locking by means of the nuts. They may also be turned to face any direction. They can be applied to any faceplate and make a very handy means of holding irregular pieces.



ADJUSTMENT STUDS FOR FACEPLATE

Repairing a Gear with Broken Teeth

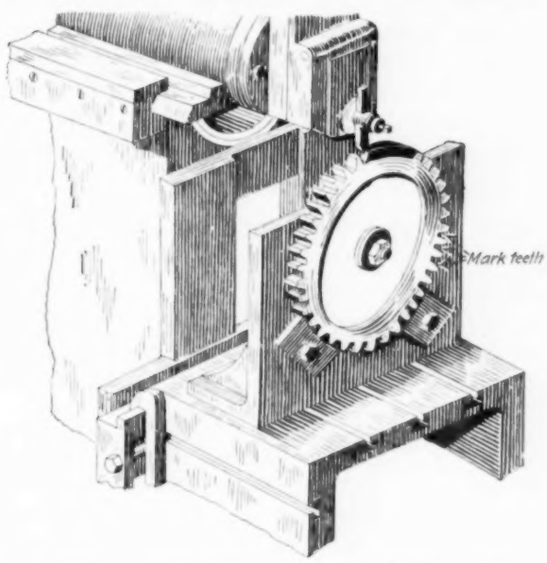
By John J. Burke

The illustration presented herewith shows a method I used to repair a gear with broken teeth.

After building up the broken space with the welding machine and finishing the top and sides, I placed the gear on an angle plate, putting two clamps under it to keep it central.

After clamping it fast with a bolt at the center, I took a sharp scriber and marked the outline of three teeth on the angle plate at one side, for use as a guide. I then ground a tool to fit the teeth and set it in one of the good teeth.

Then I raised the tool loosened the nut at the center, and turned the wheel to the place that was welded. After making sure the lines on the angle plate matched the teeth I tightened the gear and cut the first tooth. This was repeated till all the teeth were cut. The



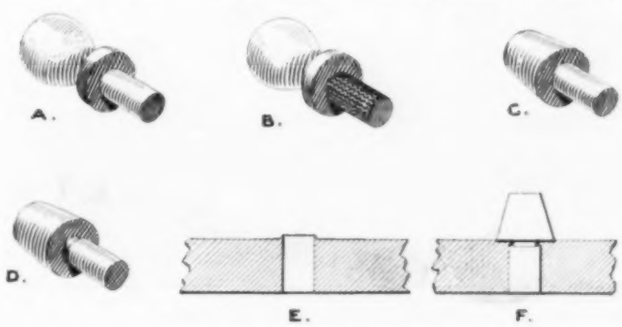
PUTTING NEW TEETH IN A BROKEN GEAR

result was a good gear with little trouble or worry. If the teeth are very coarse it might require a roughing and a finishing cut.

Methods of Holding Short Studs

By H. J. Ventner

At one time the Pullman Co. used brass butt-hinges in many places on its cars, and the vibration caused the small knob, which goes in the bottom of the butt, to fall out. One of these knobs as originally made is



METHODS OF HOLDING SHORT STUDS

shown at *A* in the illustration, and these were lost in such large numbers that the screw-machine shop received orders for 50,000 of them at a time.

Finally the scheme of knurling the stud end, as show at *B*, was hit upon with the outside of the knurling large enough to be a tight driving fit for the hole in the butt. This change seemed to turn the trick for the replacement orders rapidly grew smaller in quantity and less frequent in occurence, so that finally the small production caused the superintendent to kick about the increasing cost of the individual pieces.

The man who told me about this went on to say that he had applied a different kink to his own work, for he had some studs which he had been making as at *C* and driving them into the plates in which they were used. The studs were made as at *D* with a small groove turned just below the head. The plates were drilled from the reverse side to that in which the studs were driven so that the burr from drilling stood up from the top face as at *E*, then when the stud *D* was driven into this hole the small burr was turned down by its head into the groove as at *F*. The clinching of the burr in this manner was sufficient to hold the studs tightly.

A Drill for Use in Cored Holes

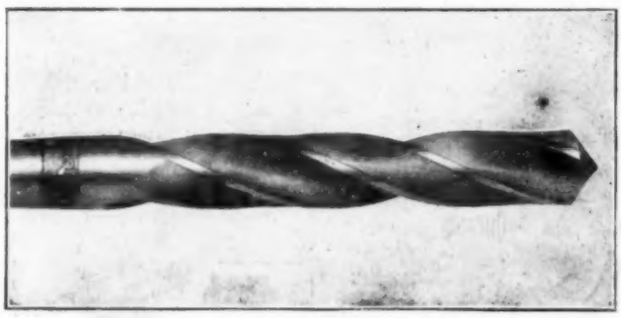
By S. J. Bedford
Morse Twist Drill and Machine Co.

On page 738 in the April 1 issue of the *American Machinist* there is an article telling how an expert mechanic overcame some of his troubles in drilling cored holes. With this article a sketch was given of the improvised drill that was used in doing the work. The article was especially interesting because the Morse Twist Drill Co. had arrived at the same solution some time before.

In April, 1913, a representative of that company was sent to the Middle West to investigate some trouble which one of the large companies was having with drills. He found that they had used all kinds of forged and milled drills, but without the results that they had hoped to accomplish, their particular trouble being breakage, caused partly in drilling cored holes, and in some instances by non-alignment of the pieces to be drilled.

It was suggested that these people use either three- or four-groove drills, but their superintendent did not look upon this suggestion with favor, because he wanted drills that would work in solid stock as well as in cored work.

After giving the matter some thought the suggestion was made that special two-lipped drills be used, these being cleared in such a way that there would be a bearing on both edges of the land, that is, on the cutting face and on the rear edge or heel. There were some special drills of this description made at that time, the accompanying figure being a photograph of one of the original drills made in April, 1913. These drills were tried out and the results obtained were even better than anticipated.



TWIST DRILL WITH BEARING ON BOTH EDGES OF THE LAND

Changing a Scrapped Press Into an Efficient Slotter

By Peter F. O'Shea

Old machines no longer needed for their original purpose may often be converted into special tools, especially if the foreman is awake to the needs of his shop. In one of the factories of the Greenfield Tap and Die Corporation, where patent tap wrenches of both large and small size are made, one of the operations is to slot out a wide run-way for the jaws of the wrench, the rectangular hole going completely through from face to back. This hole used to be machined on a shaper, one side at a time, thus necessitating four changes of position in the vise.

ONE OF THE CUTTING TOOLS

There was an old obsolete punch-press in the shop and the foreman conceived the idea of utilizing it for machining the hole in question. At first he fitted it with a single cutting tool shaped like a chisel so as to cut one side of the slot at a time, the stroke being vertically downward; but the tool could not be kept from springing away from the steel to be cut.

The result was a poor job, and the tool worked loose and fell out. It was then decided to put two of these cutting tools back to back with the proper distance between them and to have them cut the two opposite sides of the slot at once. This was done and it worked very well, because the lateral thrust on each tool was neutralized.

Besides having the tools made in duplicate and put back to back, each tool itself was made double-ended, as can be seen in the illustration, which shows the front view of one of the tools. Therefore, when the lower ends of the two tools wore out or got dull, the vise could be loosened, both tools turned about and the sharp ends put to work, without the trouble of returning to the toolcrib for fresh tools. This arrangement made a more symmetrical tool, and also made the tools long enough to get a solid bearing between their backs and along a considerable length of the vise without wasting any tool steel.

When cutting, the tools are held between two V-shaped pieces, which are inserted where the die is ordinarily placed in a diamond-shaped vise on the bottom of the slide. A special table was put on the machine. An old chuck was found in the shop and new jaws were made for it in the toolroom so that it fit the two sizes of work. Now the slotting is done some four times as fast as it was before. This is a good example of what can be accomplished in adapting old equipment to special work.

San Francisco Business Men Repudiate Pro-Metric Propaganda

IN proof of our assertion that all business men and manufacturers who understand the situation are against the compulsory metric propaganda, we call attention to the fact that on the evening of May 13, 1920, a group of the most influential business men and manufacturers of San Francisco met in the Engineers Club there and made public the statement and resolutions here given:

In view of the organized and aggressive campaign now being conducted in favor of legislation providing for the compulsory adoption of the metric system in the United States, as the sole and exclusive standard of weight and measure, it is proper that representative business organizations indicate their position with reference thereto.

The metric system was legalized by Act of Congress in 1866 and is fully available to all who find it to their advantage to use it. We see no occasion for making its use ***compulsory.***

Especially at this time, when industry is being pushed to the limit by new and different problems, the introduction of this radical issue, as a further disturbing element, would be peculiarly unfortunate.

Whatever sentiment there is for metric legislation appears to be of artificial creation, manipulated by those who have made it a private hobby.

Irrespective of any merits the metric system may have, it is clear that under a compulsory LAW, this country would have to face a long transition period; the introduction of a dual system, a confusion between the two systems furnishing a most prolific source of error and expense; a cost appalling in its magnitude involved in new equipment, fixing new standards and making new drawings, disturbance of our system of interchangeable parts, recalculations of formulas, tables, price lists, etc.; reeducation of employees in the use of new units of weights and measures and other fundamental changes, such as would inevitably result in complexity and confusion where now there is uniformity and order.

That there is no trade demand for such a revolutionary scheme is shown by the fact that American manufacturers are almost solidly arrayed against it, and that the overwhelming preponderance of the World Trade is on the basis of the inch and pound. The following resolutions were unanimously adopted:

"That we unqualifiedly condemn the efforts now being made for the compulsory adoption of the metric system of weights and measures in the United States as being inimical to the industrial and commercial interests of the country.

"That we hereby register our protests to the persistent and radical propaganda now being conducted from this city (San Francisco) to secure compulsory legislation of the character mentioned. We are convinced that such efforts do not represent the prevailing sentiment of the substantial business interests of San Francisco."

* * *

Appended to these resolutions are the names of responsible officials of thirty-five of San Francisco's leading industrial firms, representing many millions of investment.

This—please note—is in the "home" of the World Trade Club, which has been making such extravagant and preposterous claims regarding the unanimity of San Francisco's business men in favor of a compulsory metric law.

Ethan Viall

Editor

Labor and Industry

(This is the conclusion of William H. Barr's address, the first part of which was published last week.)

"In 1914 immigration was increasing in volume steadily. Assuming that immigration and emigration would have continued at the 1914 rate, we would have received in round numbers 7,000,000 immigrants for the five-year period from 1915 to 1919 inclusive. And at the rate of emigration for 1914, about 3,170,000 would have returned, so that we would have had an excess of immigration over emigration of more than 3,800,000. From 1915 to 1919 there arrived 1,612,743 persons and 1,180,859 departed from the country. Deducting the net immigration for the war period, amounting to about 430,000, the number shut out from America by the war was approximately 3,370,000.

"In reaching its estimate that the industries are short from 4,000,000 to 5,000,000 immigrant workers, the Inter-racial Council also considered the new basis of employment in many of the industries where larger forces are required as a result of the average reduction of the work-day from a ten-hour to an eight-hour period. There are approximately 8,000,000 foreign born wage earners in manufacturing, mining, transportation and other industries.

The more or less general acceptance of the eight-hour day by industry has resulted in an approximate loss in 'production man-hours' which represents the labor from 1,000,000 to 2,000,000 foreign born workers. The industries have reported that it is almost impossible for them to get men and that there has been a continuous drop in production.

"The table of official immigration and emigration, as recently 'unofficially issued,' introduces irrelevant material. It goes back to the panic days of 1907 and 1908 when emigration was abnormal. It does not show the relation of the various races to the basic industries of the country. The Inter-racial Council based its statement on an analysis of the period immediately preceding the war when immigrants were coming in at the rate of more than a million a year. Obviously, in determining what the normal rate of immigration and emigration would have been from 1915 to 1919, the figures for the period immediately preceding would be used as a basis of calculation. Conditions for 1914 or 1920 cannot be determined by statistics as far back as 1907.

"The figures credited to immigration officials do not indicate the number of aliens going into industry, and, in contrasting the immigrants coming in and those going out, they do not mention the fact that the recent immigration has been composed for the most part of men and children.

"Analysis of immigration and emigration for the period of twelve months following the armistice shows that 214,421 persons left the country and 201,475 persons arrived. Twelve of the races listed as arriving during this period supply skilled and professional labor chiefly, and for these the figures are 109,028 entering and 43,325 departing from the country.

"But the figures on the unskilled labor coming to and going from America tell a different story. For the twenty-two white races supplying unskilled labor, chiefly in the iron and steel mills, textile factories, railroads, farms and construction work, the official figures show that 68,790 came into this country and 166,925 went out, and of those coming 38,000 were Mexicans who did not relieve the labor situation except in three southern states. Eliminating Mexicans, we have a total of 30,000 unskilled immigrant workmen and their families. This demonstrates that approximately five times as many unskilled male immigrant workers left this country from November, 1918, to October, 1919, as came in during that period.

"In view of the fact that there has been no official survey to determine accurately the extent of the shortage of unskilled workers, the Inter-racial Council holds to its estimate of a shortage of from 4,000,000 to 5,000,000 immigrant workers, which is borne out by a close study of conditions and by inquiry among the industries in the country."

Just as long as a shortage of labor can be maintained in the United States the power of the unions will grow and that power is a sinister and a dangerous one, although it could be made, were the leaders honestly constructive, an effective and useful one. It is necessary for you to carefully follow Congress in connection with the legislation affecting immigration and emigration enacted there. We have been making efforts, through the Inter-racial Council, to secure from Congress a rational immigration law of a selective character, which would admit the honest but illiterate worker who is now excluded, and would exclude the sinister radical who is well educated and a source of poison to this country. The honest worker, who cannot write, is sent home, while the well educated scribbler is welcomed and turned loose in the community. All these questions are bound up in the suggestion which I make that you take an active interest in politics.

We are prone to forget that as individual Americans we have a duty to protect our country, not merely against external or internal enemies, but against the weakness of politicians and the influence of those who are seeking the promotion of selfish purposes. The badge of Americanism is the citizenship which is vindicated at the polls. Unless you take an active interest in politics you are not doing your duty. I know that every man here is patriotic, but it has not been brought home to him that he must vitalize that patriotism today in political activities as he did during the war in patriotic exertion, self denial and hard work. Let us awake to the real situation, and to the knowledge that we have in our own hands our own future and the future of the country. But let us realize that sleepless activity is the price which we must pay for preserving our own rights and the maintenance of constitutional government.

This country is suffering from the over-regulation of business, the under-regulation of labor unions, and the indiscriminate attempts of politicians to utilize classes to foster their own political ambitions. Business men are under the careful supervision of the Department of Justice, the Department of Commerce and the Federal Trade Commission. The Sherman Anti-Trust Law has wide ramifications. The Department of Commerce, essentially at least, is also an investigating body. The Federal Trade Commission watches all corporations carefully. Although I do not admit that this Commission exercises its powers with an understanding

of the fact that it was originally created to be a link between business and Government, I would prefer to see business operated under limited direction of the Government, with sane restrictions, than see it degenerate into a condition where it would attempt to set up its own standards, irrespective of the rights of the public. In other words, the fundamental idea of a certain amount of regulation for business is good, and such regulation is necessary. It is unfortunate that Government officials often arrogate to themselves arbitrary powers, but we have the protection of the Courts for a final determination of those issues. This has been demonstrated in the case of the Federal Trade Commission, where attempts at the exercise of such arbitrary power have been checked by the Courts.

If it is desirable to regulate business how much more necessary it is that the labor unions of the country should be made responsible to Government control. The Government regulation today is jughanded.

The business man is hailed before somebody for an alleged and ofttimes imaginary infraction of the law. The labor unions, on the other hand, disturb industry, because in may fields they can produce paralysis by striking. They can tie up the railroads, the coal mines, the steel mills, the express companies. They can freeze you or starve you. They can demoralize commerce, and they seem to have the will to do all these things. But the Government does not regulate, restrict, or control union labor. Congress will neither enact a law to give the Executive such power, nor would the Executive Department enforce such a law to the limit if it were enacted, as it does enforce the restriction laws against business. Labor unions are utterly irresponsible, both legally and financially, and out of your own experience you must say that they are decadent morally. Agreements with them are scraps of paper, and where there is a possibility of coming in contact with the law we see so-called premeditated outlaw strikes, which would prevent the Government from interfering with the unions, because the strikers are supposed to be insubordinate. The Government, under its war powers and through the Lever Act, has a certain amount of control ,over certain unions. That control was first exercised in the coal strike, and you will remember in what a lukewarm manner the control was put into effect. But this, too, is a war power which will cease with the declaration of technical peace. In the meantime, the unions have learned how they can avoid the law, and the outlaw strike is a direct development of their methods. Furthermore, let me recall the fact that when the Lever Act was in process of enactment it was held up by the labor unions and only permitted to pass when agreements had been reached with certain executive officials that it would never be invoked against labor. When the Attorney General dared to invoke it, Samuel Gompers charged bad faith, and told of the agreement. That agreement, of course, was a violation of the oath of office of the officials possibly entering into it.

Is it not our duty, therefore, to urge that the unions must be put in a position where they will be responsible to the people, to the Courts, to the Government? Until that time comes we shall have a class autocracy attempting to dominate industry, and clearly dominating politics and the industrial welfare of the country. It is our duty to see to it that a Congress and an Executive are elected who will deal equitably with business, with labor, and with the American public.

It is probable, too, that our labor both American born and immigrant do not altogether appreciate the wonderful opportunities that our land offers, for we have been lavish with possibilities for material advancement.

We have more than 700,000 farms under cultivation, most of them being originally Government grants. We have thousands of acres of cut-over land ready to be granted, cleared and cultivated, waiting for anyone who will operate them.

We have nearly 250,000 schools and colleges where the studious ambitions of any person may be translated into development. We have hundreds of thousands of industries employing as many separate talents.

We have 250,000 miles of railroad, immeasurable water power, mines, factories, farms, club life, educational centers, sports, amusements, opportunities. Anyone can have everything he needs if he has the spirit of enterprise and honest effort.

Therefore, why then should not our workmen, many of them being employers in the making, concentrate not in group criticism of those who have been successful in industry or profession, but rather in a rigorous attempt to contribute their own best effort to the highest development of those resources which will help America to retain its international commercial leadership. Cannot we in groups or individually help to foster this spirit instead of that unfortunate antagonism now expressed by union labor.

In conclusion, I will quote a sentence from the utterances of Abraham Lincoln: "Capital has its rights which are as worthy of protection as any other rights. Nor is it denied that there is and probably always will be a relation between labor and capital producing mutual benefits.

"The strongest bond of human sympathy outside of the family relation should be the one uniting all working people of all nations, and tongues and kindreds. Nor should this lead to a war upon property or the owners of property. Property is the fruit of labor; property is desirable; is a positive good in the world. That some should be rich shows that others may become rich, and hence is just encouragement to industry and enterprise.

"Let not him who is houseless pull down the house of another, but let him work diligently and build one for himself, thus by example assuring that his own shall be safe from violence when built."

Newton Sees Bright Business Outlook

The following is an extract from the address delivered by Albert E. Newton, president of the National Machine Tool Builders' Association, at the opening of the convention of that body at Atlantic City, N. J., May 20, 1920.

At our last convention, we were rather surprised that business conditions had held so favorably since the signing of the Armistice. We had been promised, and most of us had looked forward to a real depression, at least, in our own line of industry.

We thought so many machine tools had been produced during the war period, and that so many of those were to be released by our government, that it was reasonable to believe that we should have to meet an over-supplied market. Fortunately for us, things have turned out quite different. Instead of the depression, we have experienced a most unusual and an easy-selling market, and have had a very prosperous half year.

Government-owned machine tools have not unduly flooded

the market, excepting those of educational institutions. An absorption of a large quantity of machine tools by these various schools is bound to benefit the whole country.

The need for mechanical training is greater today than ever before, and it will be still greater in coming years. I believe that we are just starting a new period of trade and technical school development, and that the importance and necessity of these institutions is becoming more and more apparent, because of our actual dependence upon machinery and mechanical devices, for the maintenance of our present, and any future betterment of our living conditions.

Today, most of us are experiencing a shortage of new orders, although having plenty of unfilled orders on our books.

I am looking forward to the resumption of good business conditions in a few months. In other words, if we are to have a business depression, it will be of short duration.

The price-cutting wave now attracting attention throughout this country, is caused by the calling of loans, or the refusal of loans, rather than the over-supply of materials; and in most cases these same materials which are being disposed of by the retailers, could not be replaced at a price as low as they are now being sold.

In the machine-tool industry, I know that we could not in the near future, replace our inventories of finished and semi-finished materials at anywhere near the cost of our present inventory.

I also know that during the past several months, our costs of production have increased much faster than our selling prices. Therefore, the prices of machine tools will remain at least as high as the present level.

During the next few days we will distribute to our members copies of a revised uniform cost-accounting book. Some of our newer members may not know of the efforts we have made to interest all of our members, and the idea of having uniform methods of cost accounting adopted, especially among competitors, as if we all knew our true costs, then no one would be liable to suffer from the results of ignorant competition.

I sincerely hope that we all know approximately what our costs are at this time, and if you do not know, you should lose no more time in getting started, as it takes a good while to obtain this knowledge.

Perhaps you will remember that at our last convention we had the Miller-Franklin representative here talking to us with reference to carrying our ideas further along the lines of uniform cost accounting. In other words, I think most of our manufacturers have adopted a system of cost accounting that compares favorably one with the other. But in order to get the best results among competitors, we feel that it would be advisable if some plan could be adopted along the lines as suggested by the Miller-Franklin people. Whether it might be carried out by those people or not that is another matter; but along the lines of having a man doing patrol work; in other words visiting each member of our Association and giving him the benefit of the knowledge that he has picked up in his past experience, and also in visiting other members, and see to it that each member includes every item of cost or other item that should be included in his costs.

It was pointed out last year that sometimes we think we have our true costs of machines; but, at the end of the year, we find that we have a whole lot to write off. That which is written off at the end of a year is really a part of your true costs; and if we have to go a whole year before finding out what our true costs are, we are liable to be selling goods cheaper than we should.

Extracts from National Foreign Trade Convention Addresses

"The Relation of Our Industrial Capacity to Our Foreign Trade," by James A. Farrell, chairman National Foreign Trade Council and president U. S. Steel Corporation:

American industrial development has reached the stage when the United States must become, in all that the words imply, a foreign trading nation. That involves the further requirement that the American people generally must understand their personal relation to the international commerce of the country as a whole; they must realize that it is not only those directly connected with foreign trade, but every inhabitant of the land, wherever located and however occupied, that shares in its benefits and bears a direct responsibility for its continued success.

Fifty years ago the total of our exports was less than one-twentieth of their value in 1919. Of the total, raw materials and foodstuffs together contributed more than 81 per cent and manufactures less than 19 per cent. In 1919 manufactures, including manufactured foodstuffs, accounted for over 70 per cent and raw materials and foodstuffs in crude condition for only 29½ per cent. In other words, we have definitely shifted from being a nation whose preponderant products were agricultural to a nation whose production is chiefly industrial.

The European war made of us a foreign trading nation, one of the main causes being its stimulation of the expansion of an industrial capacity. It is the effect of that greatly enlarged basis of production with which we are now vitally concerned. The salient fact is that the war greatly stimulated production in a large number of lines, which, with the return of peace, were equipped, as never before, for export production. We see that we have created an enormous machinery for production all over the country, while our machinery for salesmanship and distribution to the foreign consumer requires further development in order to compete with countries which have been at war but can now increasingly compete with us in manufacture for the world's trade.

The fact has always to be borne in mind that foreign trade is at least two-sided, and that it can be successful only when both sides derive profit from it. Imports pay for exports, and we have a huge balance of exports to be paid for. We have no longer a great annual interest bill to meet in London; that has been replaced by an interest bill twice as large to be met in this country. Necessarily, a large part of this bill will be met with goods, and those goods will come into a market equipped industrially to produce much more than it can consume. There is, of course, always room for certain classes of imports; no country is capable of producing all that its people need and desire. We shall continue to sell large quantities of our products in the very countries of Europe which are deeply indebted to us. We shall be confronted, in a quite unmistakable way, with the fact that we are able to produce more than we can sell at home. We shall face, accordingly, such an urgency for foreign trade as we have never before experienced.

The development of our industrial productive capacity during the war, coupled with the change in our national financial status, might, if unintelligently handled, be the forerunner of distress. But if only it be handled with intelligence, energy and courage, there lies in it a vastly greater potentiality for general benefit through foreign trade.

"Why Direct Selling," by William L. Saunders, president American Manufacturers' Export Association:

Just as a straight line is the shortest distance between two points, so is direct selling the shortest and surest way to sell goods. This axiom applies as well to domestic as to foreign trade. Manufacturers at home have the means

to reach customers by direct methods; they know the country, the ways of doing business and the facilities for financing orders, hence domestic trade attracts first attention and returns come in in large volume. Not so with foreign trade. With the exception of a few of the larger manufacturers there has been little determined and fruitful effort to reach foreign fields. Every one has at all times been willing to give special discounts to agents for foreign trade, to send catalogs, to advertise, and even to share the expense with others in sending a traveling man abroad; but this only approaches the situation; it is a mere picking process which sometimes enables one to get rid of a surplus stock at a sacrifice; but it does not, and cannot, establish those relations which are a necessary precedent to a permanent and enlarging business. Such methods are amateurish and not professional. We all practice them in the beginning. When we get wise through experience, we turn to direct selling.

At first, except with large concerns with plenty of money, it is best to get desk room in a house of established reputation. This enables one to get accustomed to the ropes, to learn the ways and means of doing business and to obtain credit. After a while, if all goes well, the branch can be extended. Not only does direct selling bring the maker and buyer in closer contact and afford means of mutual sympathy and interest, but it enables the maker of the goods to more nearly meet competitive conditions. It shows him how to build his product to meet the needs or the fancies of his customer. He gets closer to him. There is also a psychological value in direct selling. The customer thinks and feels that he is in a position to get better prices and terms. Close contact between principal and agent always makes for the best results; there is created a mutual bond of interest. All trade to be permanent and profitable must contain the elements of mutuality of interests. Direct selling promotes this; it is like seeing a man yourself and talking things over with him rather than writing letters or sending some one else to talk to him and represent your case.

Direct selling through advertising alone cannot fully meet the situation. It does some good in certain lines which are simple, or of a common or standard nature; but it is at best unsatisfactory and of temporary value. All buyers in all countries like to place orders with some one who is on the spot. In machinery trades, this is of the greatest value. The buyer feels that there is some one nearby to take care of the product, to see that it performs properly and to aid in overcoming difficulties and in repairing trouble.

"Methods of Surveying New Markets," by E. Wilhelmi Droosten, of the Robbins & Myers Co.:

You study your domestic business, so must you study your export business; and in a way, it is similar to the business done in the different States of our country here at home. You should analyze each foreign country and find out if what you have to offer is saleable or not. You may have a product that will sell in one or more countries while in some of the others there would be no demand.

The matter of delivery is an important factor, as the foreign buyer is a long way from the source of supply. He has to figure, even at best, when he places an order, it takes two to six months before he can get his goods; and when it is a matter of a year before he receives them, which I have known to occur frequently, he is without the stock of goods he has figured on having, and this means a loss of business to him with his expenses going on just the same. So, if you want to build up a foreign trade, you should be particular that your export orders are given prompt attention and that prompt shipment is made. Also the packing of your goods should be carefully looked into so that they arrive in the best possible condition, and that no errors are made, as it takes a long time to rectify mistakes and they are bound to be expensive to someone, either you or the buyer.

If you fill your factory with a lot of domestic business which prevents you from giving your export orders the proper attention, and you neglect your foreign customers, giving your domestic business the preference, and you wait for a slack time in your home market and then decide to devote your attention to getting foreign business, then to try to get it quickly is impossible. It takes a long time to build up a foreign business, and you have to do everything you can to hold it so that it is there where you want it.

It depends largely upon the men you employ, an honest representation, and the fulfilment of your promises in giving full weights and maintaining the standard of your goods as they are represented to the foreign buyer, along with a give-and-take policy, always bearing in mind that the buyer has his side of the question as well as you, and that he appreciates you when you study his interests and his welfare. If you give your foreign customers service, they appreciate this more than anything else; and when you do this, you can depend on holding their trade against all competition.

Do not attempt foreign trade unless you intend to make it a part of your business. Analyze your markets before you start, and your ability to do the business right. Do not look upon the foreign market as a secondary condition or a dumping ground for left over or imperfect goods. If you make a start with a foreign customer, stay by him. England, Germany, France and Austria put in intelligent effort to develop the big foreign trade they had, and you will have to do the same. The concerns in this country who have made a success of their domestic business owe it to a thorough knowledge of their home market conditions. They can make the same success in foreign lands if they plan as carefully. Educate your employees at the factory in the export business so that the different departments may become familiar with it and know how to take care of it intelligently, so they do not feel that there is some mystery about it, as many of them now do. For this reason it is frequently sidetracked and domestic business, with which they are more familiar, is given the preference. To the man who has made a study of the export business, it is easy, as certain rules and conditions have to be complied with to the satisfaction of the foreign buyer. You can hold his business against competitors who come with lower prices and more attractive propositions because, as I have already stated, he realizes he is a long distance away from the market of supply, and if he is given the service so that he gets what he orders and within a reasonable time, and his goods arrive in good shape so he can go on with his business, he appreciates it, and it is difficult for anyone to take his business away from you.

"The Work and Service of American Chambers of Commerce Abroad," by Charles W. Whittemore:

The primary mission today of American Chambers in foreign fields is to do their part in the battle to retain existing commerce. If we can hold what we have already secured, we will be in the best sort of position to extend and expand. In fact, if we can hold what we have, extensions will come inevitably and automatically. The struggle at present is to avoid loss of ground; to prevent foreign competitors from succeeding in their efforts to dislodge us from positions we now hold. The fields in which a Chamber abroad can do most to protect existing trade and stimulate greater volume is in the arbitration of commercial disputes. A speedy, practical and satisfactory adjustment of differences of opinion by the interested parties themselves will do more to create good-will toward American commerce than any other one individual factor.

Apparently the weakest link in our industrial chain is the packing room, where a desire to handle a maximum volume at a minimum expense or a lack of flexibility in the men in charge, lead to deficient packing with the result that either the merchandise arrives in bad order or the cost of transportation is in excess of what it should be. These results naturally hamper us in competitive efforts. Lack of knowledge of foreign standards and terminology causes many complications.

Foreign trade is a frame of mind. As a nation we have not acquired it, as is shown with disconcerting clearness by the scarcity of Americans qualified to assume administrative positions abroad. Our foreign trade has grown so much

faster than has the education of our young men to take care of it that we see many of the largest American companies represented by non-Americans.

A situation similar to this does not exist among any of the competitor nations. A company will naturally and properly entrust its interests to the man best qualified to protect and enhance them, irrespective of nationality; and I am glad to say that the non-Americans I know, and they are many, who represent American houses, are as a whole, able, loyal and efficient administrators. It is not that there is anything but praise to be said about these non-American representatives, but it is deplorable that a condition exists which makes their appointment a necessity.

It is surely an anomaly that after having gone as far as we have in foreign trade, we still have to select non-Americans as agents abroad, just as we still have to depend on foreign bottoms for much of our mail, freight and passenger transportation.

The question of the admission of non-American representatives to membership in the American Chambers abroad has provoked considerable discussion in Buenos Aires and elsewhere, and some of our citizens feel strongly about the subject—perhaps too strongly. From the point of view of the welfare of foreign trade, it is not desirable that changes be made, but when with the passing of the years, positions of responsibility abroad become vacant through natural causes, properly equipped Americans should be ready to step into them.

A hopeful sign that foreign trade as a national frame of mind is making progress is to be seen in the gradual increase of the number of American houses which are withdrawing their accounts from local dealers and are opening up direct representations. It has been a matter for wonder why American manufacturers of mining, agricultural and industrial machinery, among other lines, have been willing to allow established merchants, generally German or British, to handle their products year after year, earn enormous profits and acquire all of the local merit. They have been willing to subordinate their names to the names of the local dealers and to submerge their identities under the prestige of the merchant on the spot. The war brought a number of these long-standing arrangements to a sudden close, and other houses are establishing direct representation under advice of specialists sent to study the foreign fields. Chambers abroad welcome this development, for they feel that Americans should handle American goods, and are anxious to do all they can to stimulate the tendency, for it is bound to result in increased volume of our export trade.

An American Chamber abroad can do much to ensure the maintenance of sound moral ethics in overseas business. The success of the firmly established houses is due to adherence to high standards, and these houses in self-defense, as well as for patriotic reasons, must see to it that the newcomers in the foreign field are guided by the same rules. In the export field, the older and more experienced house is certainly "his brother's keeper," and both must stand together or both will be the losers. It is said occasionally that it is rather too much to expect American concerns, which have spent years and much money and effort in building up a foreign business, to go out of their way to encourage competitors to enter their field of activity, but this is not the attitude of most Americans who live abroad. Competition is to be anticipated in every line of business, but competition from our own people is for many manifest reasons preferable to competition from other nations. Moreover, the mere element of national volume brings appreciable advantages which, in the long run, are bound to be factors of importance.

Without fear of the competition which may result, the established houses have been consistent in their support of the Chambers abroad. The one uniform lament of all the Chambers with which I am acquainted is that the houses just entering the foreign field, or which are intending to do so, do not join.

They are the ones a Chamber can most effectively serve; they are the ones which can bring out the full measure of a Chamber's usefulness. Chambers abroad do not ask them for contributions, they ask them to become members. They ask them to realize that Chambers abroad are important factors in the development of American foreign trade, that their support is a matter of patriotic duty, and the time the support is needed is now, today, and not next Fall or next month. With adequate support Chambers abroad can expand into channels of usefulness now closed to them and can perform their part in the great national effort to increase foreign trade, for which, by location and opportunities, they are peculiarly fitted.

"Reorganization of the Foreign Service of Our Government," by W. W. Nichols, Allis-Chalmers Manufacturing Co.:

A congressman is in duty bound to interpret and support the sense of his constituency, only a small minority of which comprehends the importance of our foreign trade. Too many of us try to delude ourselves, however, with the utterly fallacious conclusion that, because we do not want to have anything to do with the rest of the world, we need not. If we agree, therefore, that the fault lies not with Congress but rather in the undecided or misguided opinions of our citizens, the Congressional Record becomes an index of Public Opinion. Any appeal to Congress may have but a temporary and very uncertain effect when permanent measures are contemplated; we must go direct to the People instead. We know that now better than ever, since events of five years have proved it beyond a doubt. We cannot emphasize too strongly that concentrated action at Washington may fail of its purpose of improving our foreign service; we must depend on the positive assertion of enlightened Public Opinion for the constructive legislation so imperatively needed. Our first step, then, is to arouse a powerful and insistent public sentiment everywhere favorable to a reorganization; then reorganization will follow inevitably.

We should be so obsessed by our desire to promote foreign trade for the country's good and so convinced of the close relation of government to it, that consciously and unconsciously we shall exert a contagious influence on the sentiment of our particular community.

Time and again, as we fully know, well laid plans of foreign traders are unexpectedly checked by some legal restriction abroad, which is nothing other than governmental interference that can only be countered by governmental action. Such action will be just as effective as the strength of the organization back of it. All negotiations are battles of wits and participants should be at least of comparable skill else an unfair and temporary result obtains. To hold our own in our dealings with foreign nations our governmental agents must be competent to meet every situation. This requires intellect especially trained in difficult and complicated diplomacy and capable of a sympathetic response to foreign thought methods, habits, customs and all that constitutes dispositions incomprehensible to the inexperienced. This should be esteemed as of first importance. Such knowledge does not come by native intuition and cannot be expected in the provincial who too often in the past has been called upon by partisan preference to represent and protect American interests abroad.

Truly, a highly organized foreign service is to our civilization a necessity whose importance cannot be overestimated but deserves our best thought. Other nations, like Great Britain, France and Italy, who have demonstrated a superior capacity for foreign trade, are now reorganizing and enlarging their foreign departments in the light of the better knowledge of their needs derived since the war. This is remarkable in view of their invariable rule to appoint only trained specialists of long experience. A national sagacity to condemn our indifference!

Without a strong foreign service to forestall misunderstandings, adjust differences, extend trade and other peaceful relations, and above all to exert our high influence in the preservation of international peace, our future becomes indeed mysterious and uncertain. Foreign service departments function only in times of peace; the last act in the severance of peace ties between nations is the withdrawal of all those forces who have no place in war. The army and navy are taught to fight; foreign service departments seek peace only, and their usefulness ceases when war begins.

Reorganization of the Foreign Service of our Government is now receiving the attention of a joint committee recently appointed by the National Foreign Trade Council, American Manufacturers' Export Association and the National Civil Service Reform League.

"How to Use the Federal Information Services," by E. A. Brand, secretary Tanners' Council of the U. S. A., formerly Assistant Director Bureau of Foreign and Domestic Commerce:

The two great agencies for promoting the foreign trade of the nation are the Bureau of Foreign and Domestic Commerce and the American Consular Service. Only since 1908 has the Bureau of Foreign and Domestic Commerce grown from an office occupying a three-room cubby-hole, with an annual appropriation of $15,000, to a service with a big central information office at Washington, and many branches in the United States, commercial attachés in the principal embassies, and traveling trade experts scattered all over the world.

After a first-hand study of most of the governmental bureaus in Europe, I can truthfully say that our own Bureau at Washington is the best in the world. The central office is well organized into geographical divisions and has the most detailed data about foreign buyers, tariffs, trade-mark laws, commercial travelers, statistics and every other subject connected with the promotion of foreign trade. In years past I have seen copies of replies to hundreds of letters from consuls to American firms furnishing information that could easily have been secured at Washington and a number of weeks saved in securing same. In short, it has the finest commercial library in the country. There are probably 20,000 volumes in it and it is open to everybody interested in foreign or domestic commerce.

It is pointed out that trade promotion is only one of the many functions of a consular officer. He certifies to all shipments from his port to the United States, visés passports, looks after ship clearances, pays wages of American seamen, reports on quarantine and immigration matters, makes fiscal statements to Treasury and crop reports to Agriculture. In China and Turkey he has judicial functions. He even certifies to marriages and deaths of Americans in his district. In the large cities such as London, Paris, Shanghai and Buenos Aires, he has several deputies or vices, and the work is partitioned. For example, there is usually one man who handles inquiries from firms in the United States and receives traveling salesmen visiting abroad. At the smaller posts the consul and one deputy usually do the whole job.

As far as trade getting is concerned, our consuls are far more active than those of any other nation. Indeed, some British consuls are said to believe such work beneath the dignity of the office. Our people also do a better job than Germans, notwithstanding the boosting talk to the contrary.

An Old Method of Working Out Indicator Diagrams

By John S. Watts

In these days of labor-saving devices, the younger members of our profession are very prone to be at a serious disadvantage when the instruments they are accustomed to using are not available.

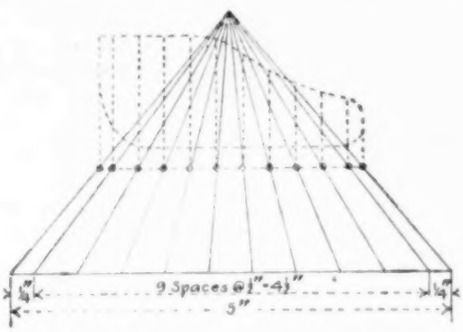
Take the planimeter for example: If you ask the average young engineer to work out the area of any plane figure, with an irregular boundary line, such as an indicator diagram, or a plot of land, he is all O. K. so long as the planimeter is handy; but if it is not, he is likely to spend as many hours as an old-timer (who remembers when there was no planimeter) will spend minutes in solving the problem.

The young engineer is hardly to be blamed for this, but the moral is that it is worth while to be conversant with the old methods as it is inevitable that one will some time or other be in a position where problems will require to be solved without the aid of the most modern equipment.

The method of determining the approximate pressure recorded on an indicator diagram by taking the average of the heights measured on ten equally spaced points, is I believe still well known, but the time spent in spacing off these lines, can be considerably reduced by following the method outlined below, which, while being an old one, I have never seen published.

Take a piece of tracing paper and draw on it a base line, which must be longer than the length of the diagram to be divided (for indicator diagrams 5 in. will do) and mark on this base line the ten divisions as shown in the sketch herewith. Join all these divisions to a point at any convenient height, say 5 in. above and vertically over the central point of the base line.

Lay this piece of tracing paper over the diagram or figure to be divided, sliding the tracing up or down until the length between the outside diagonal lines on the tracing coincides with the length of the diagram.



AN OLD METHOD OF WORKING OUT INDICATOR DIAGRAMS

By pricking through on each divisional line, the diagram will be divided into ten spaces with the end spaces one-half the width of the other spaces, which is the spacing we require.

In using the tracing paper, keep the base line of the triangle parallel with the atmosphere line on the diagram or a slight error will be introduced in the spacing.

The diagram, being divided up the quickest way to get the mean height is to take a strip of paper and mark on it the length of each line consecutively in addition; or, in other words, add the lines up graphically on this strip and then divide the total length by ten. The answer will be the mean height, which multiplied by the scale of the indicator spring will be the mean pressure.

If a piece of tracing paper is not available, the same method can be used by drawing the lines in a similar way directly on the diagram, the apex of the triangle being located by the junction of the outside diagonal lines.

Obviously, also, the same principle can be used to determine the area of any irregular figure. Having found the mean height as explained above, simply multiply it by the extreme length of the figure, and the product will be the area.

A tracing of this kind made to a fairly large size is a handy thing to have in any drawing office, as it is very convenient for spacing off holes, or dividing up lines to any number of points within its capacity.

SHOP EQUIPMENT NEWS

-Edited By-
E. L. DUNN and S. A. HAND

SHOP EQUIPMENT • NEWS •
A weekly review of modern designs and • equipment •

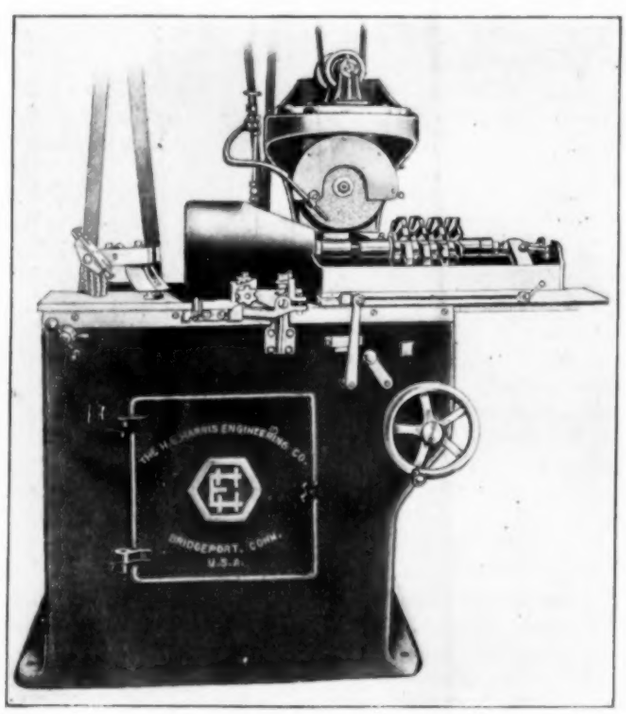
Descriptions of shop equipment in this section constitute editorial service for which there is no charge. To be eligible for presentation, the article must not have been on the market more than six months and must not have been advertised in this or any previous issue. Owing to the news character of these descriptions it will be impossible to submit them to the manufacturer for approval.

• CONDENSED • CLIPPING INDEX
A continuous record of modern designs • and equipment •

Harris Automatic Hob-Grinding Machine

A recent addition to the line of the H. E. Harris Engineering Co., Bridgeport, Conn., is the No. 815-B automatic hob-grinding machine, illustrated herewith.

This machine will grind hobs with any number of flutes up to 26 and not exceeding 8 in. in diameter and 10 in. in length. Hobs with straight or right- or left-hand helical flutes can be ground. A fine adjustment contro's a forming slide coupled to the table and work spindle in such a way as to rotate the hob during longitudinal travel of the table. This adjustment is graduated to read to one-half minute of arc and can be changed while the machine is running. The index plate is readily accessible and can be removed by loosening a knurled nut. Indexing is automatic and takes place when the table is in one position only. The table travel can be operated either automatically or by hand. The grinding head is mounted on a circular base and can be swiveled horizontally so that the wheel may be set to the required angle for grinding a hob with helical flutes. The diamond truing d:vice will true either side of the wheel to the desired angle. It will also true the periphery of the wheel and can be used without interfering with the set-up. An automatic feed is provided which can be set so that a predetermined amount will be ground off the face of the hob teeth and when that amount has been reached, it will be disengaged. It is claimed that the pump is self-priming and non-clogging and will deliver a copious stream of coolant at the point of grinding.

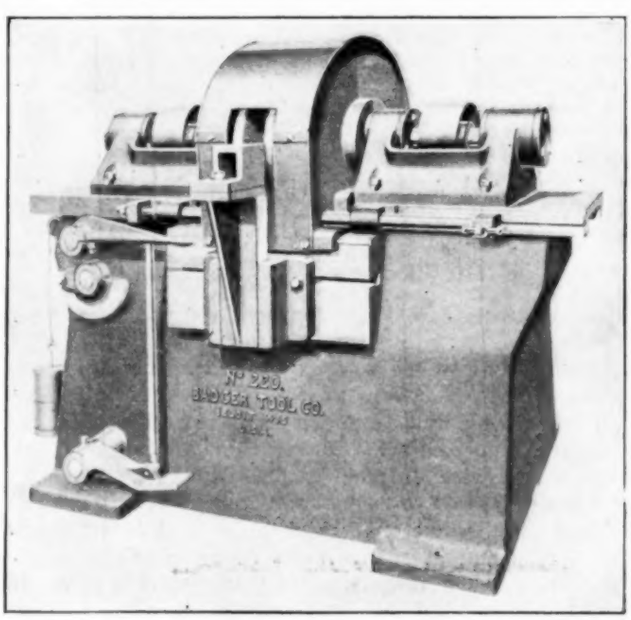


HARRIS AUTOMATIC HOB-GRINDING MACHINE

Badger Double-Spindle Disk-Grinding Machine

The Badger Tool Co., Beloit, Wis., has recently put on the market the double-spindle disk-grinding machine shown in the accompanying illustration. The machine, classified by the maker as No. 220, is intended for finishing the two opposite parallel faces on such work as piston rings, nuts and drop-forged wrenches.

Two 20-in. disk wheels are carried on spindles 2⅞ in. in diameter mounted in both radial and thrust ball bearings. Two 16-in. abrasive cylinders held in chucks are interchangeable with the disk wheels, and extra equipment can be furnished by the maker so that water may be used. Among the features of this machine are the provision for excluding grit from the ways under the sliding head, the positive micrometer stop for the

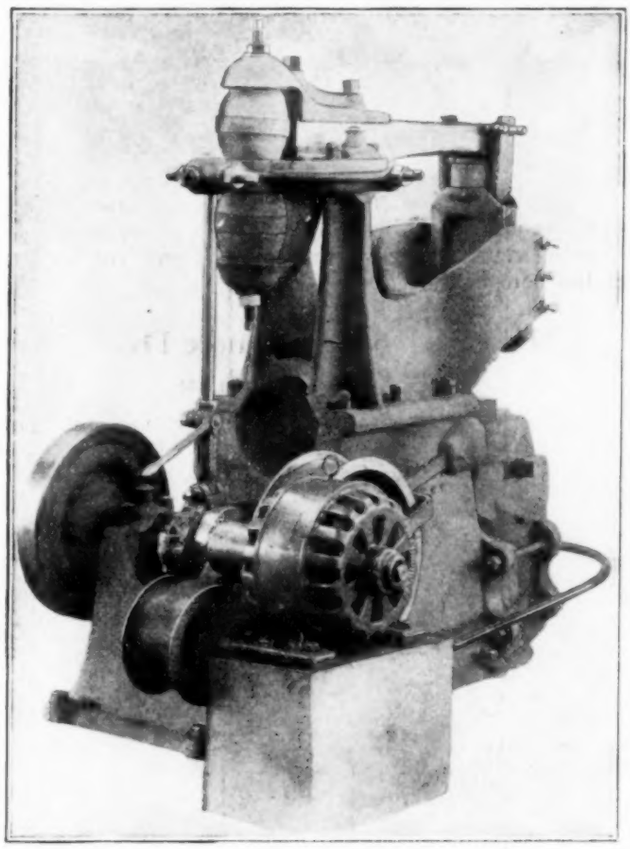


BADGER NO. 220 DOUBLE-SPINDLE DISK-GRINDING MACHINE

sliding head and the rigid construction of the work support. The machine can be furnished equipped for either belt or direct-motor drive. The height of the spindle from the floor is 38 in., the over-all length of the machine is 70 in. and the net weight is 4,700 lb.

Bradley Motor-Driven Hammer

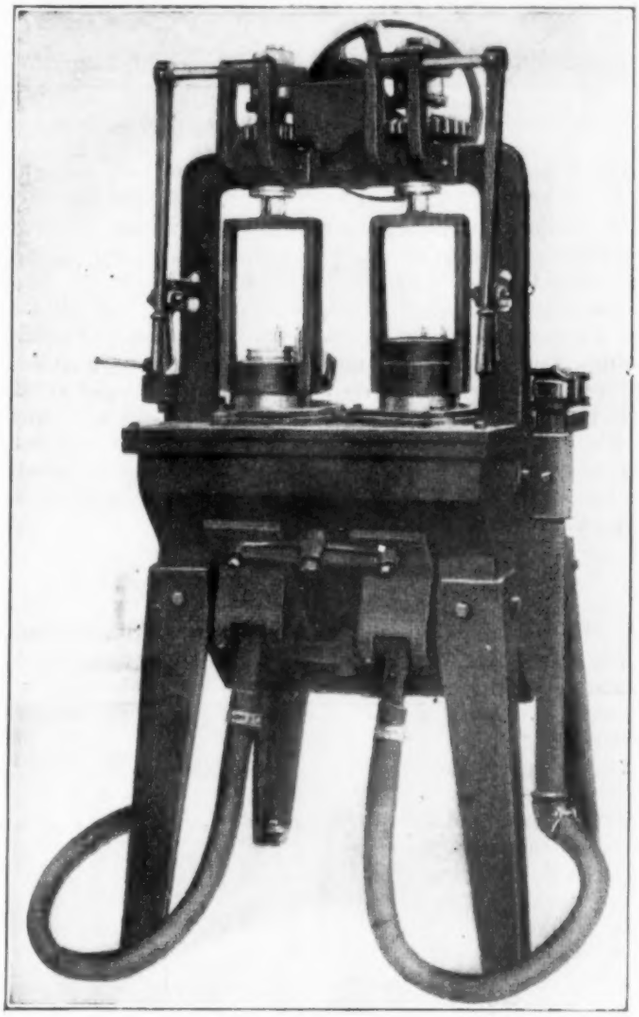
Motor-driven helve hammers made by C. C. Bradley Inc., Syracuse, New York, are now being furnished with the drive arranged as illustrated. The hammer is controlled in the usual manner by a foot treadle which applies and regulates the pressure of the idler pulley against the loose running belt. Formerly a motor was not included as part of the hammer equipment, and if used for the drive a separate countershaft, with two loose pulleys between the motor and hammer, was required.



BRADLEY MOTOR-DRIVEN POWER HAMMER

Gray Piston Blasting Machine

The machine shown is adapted for cleaning the inside of pistons with steel grit or shot and is said to be capable of doing this work at the rate of 140 to 150 pistons per hour. The machine is manufactured by the Gray Machine Tool Co., Inc., Buffalo, N. Y., and employs the same principle as that of a similar machine made by the same company for blasting shells. In operation the piston is placed in the holder, open end downwards, and a cover placed over it. The piston when lowered by a lever to the correct position automatically starts rotating. A lever operated quick-opening valve in the air line is used to control the blast. The work holders operate independently thus allowing the work to be changed in one, while the other is revolving. The nozzles are adjustable to any desired position and usually operate at the mouth of the piston opening. The drive pulley is 12 in. in dia., runs at 100 r.p.m. and is driven by a 2-in. belt. The machine shown will handle pistons up to 3½ in. dia. The air consumption amounts to about 40 cu.ft. per min. at 70 to 90 lb. pressure. The machine occupies a floor space of 36 x 42 in. and weighs 800 lb. packed for shipment.



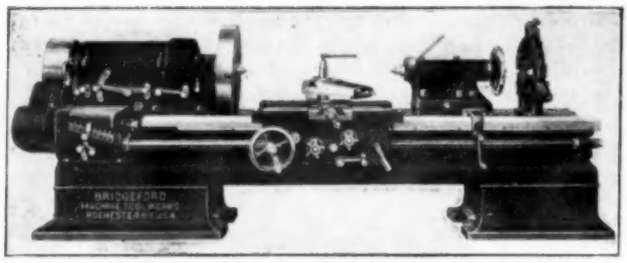
GRAY PISTON BLASTING MACHINE

Betts-Bridgeford 26-In. Geared-Head Lathe

The Betts Machine Co., Rochester, N. Y., has added to its line the lathe shown in the illustration herewith.

The headstock is of the all-geared inclosed type, and is operated by a powerful expanding ring friction clutch upon which is mounted the driving pulley. This clutch is operated from the apron, a position which is always convenient to the operator. The same movement which disengages the clutch automatically applies the friction brake, thereby stopping the machine almost instantly.

There are nine spindle speeds of the selective type arranged in geometric progression. Three direct speeds, three high back-gear speeds, and three low back-gear

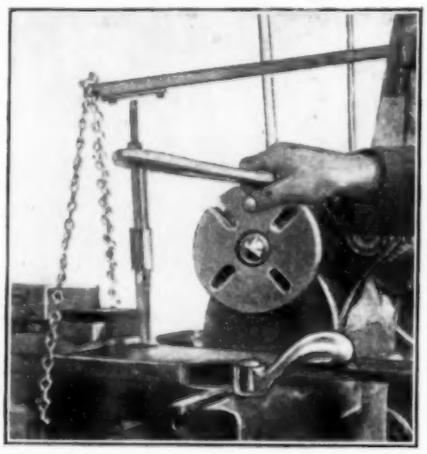


BETTS-BRIDGEFORD 26-IN. GEARED-HEAD LATHE

speeds are obtained almost instantly by conveniently located levers in front of headstock. All speed changes are through hardened-steel sliding gears and positive clutches running in oil, the sliding-gear teeth being rounded to allow easy and instant engagement. No two speeds can be engaged at the same time. All shafts and gears are located in the lower half or base of headstock, thereby allowing easy access to all of the parts, it being necessary only to remove the cover. All shaft bearings are bronze-bushed and lubrication is by means of a splash and chain oiling system. When machine is motor driven the motor is mounted on top of the headstock cover and directly connected through gearing to the main driving shaft.

The Ackland Screwdriver

The Ackland Specialty Co., 146 College St., Springfield, Mass., has brought out the screwdriver and attachments illustrated herewith. It is claimed that a few pounds pressure on the upper bar and the ratchet handle will remove the most stubborn screw. The extension post is attached to the screw-driver blade by a case-hardened socket. A ratchet wrench which permits using the tool in restricted places is arranged to slide up or down the extension post so that it can be used in any desired location. The upper bar is attached to the extension post by a ball joint, permitting movement in all directions. Three screwdriver blades—$\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$ in. are furnished. The ratchet wrench is double ended—one end fitting Ackland sockets and the other end fitting standard sockets.

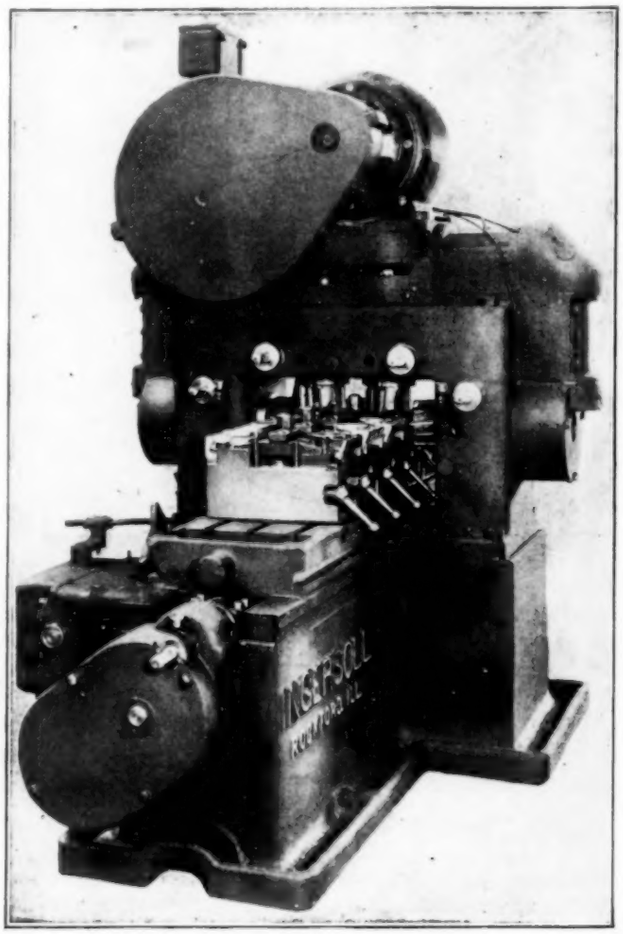


THE ACKLAND SCREWDRIVER

Ingersoll Semi-Automatic Milling Machines

Recent additions to the line of the Ingersoll Milling Machine Co., Rockford, Ill., are milling machines with automatic and semi-automatic feeds, one of which is illustrated herewith. Ordinarily they are built as single-purpose machines, but by the application of suitably designed fixtures they can be employed for finishing different pieces of work.

The machines are similar in some respects to the reciprocating-type machines, but differ in the feed characteristics of the table. The table feeds past the cutters through its entire length, the operator removing the pieces as fast as they are finished. When the last cut is finished, the table rapidly advances a short distance and then stops. The operator can then remove the last casting and by a lever control throw in a rapid return traverse which carries the table back to its original position, where it again automatically stops for reloading. After loading the first fixture the table is started and rapidly traverses until the work almost reaches the cutters, when the normal feed is automatically engaged. The balance of the fixtures are loaded while the cutters are operating.



INGERSOLL SEMI-AUTOMATIC TYPE MILLING MACHINE

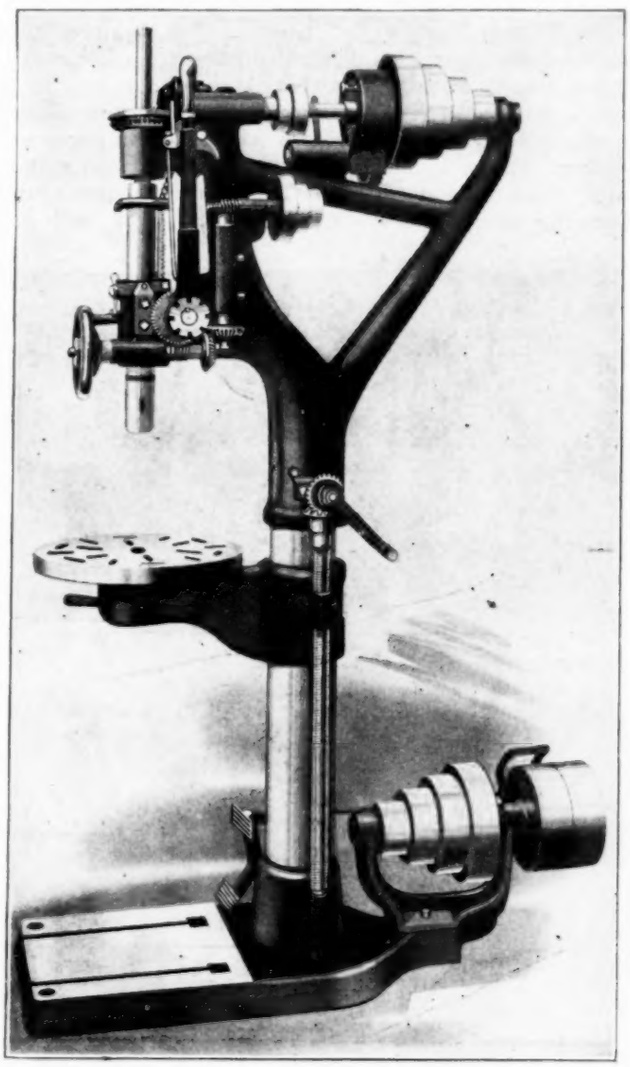
Specifications: Four-spindles. Table, 14 x 67 in. Floor space 34 sq.ft. Weight 10,000 lb.

The machine shown is equipped with fixtures which each hold two pieces of work back to back.

A variation of this type of machine is built for handling large pieces which have an obstruction at one end of the cut that prevents them from passing clear of the cutters. To handle this work the table feeds the work into the cutters to the end of the cut and then automatically returns at a high rate of speed to the loading position where it stops. Machines of this type can be fitted with a number of spindles to finish several surfaces at the same time.

Hoosier 20-In. Vertical Drilling Machines

The Hoosier Drilling Machine Co., Goshen, Ind., is manufacturing a 20-in. vertical drilling machine in four different styles, one of which, the No. 4, is shown in the accompanying illustration. The No. 1 machine is fitted with plain drive, has a round base, and adjustable



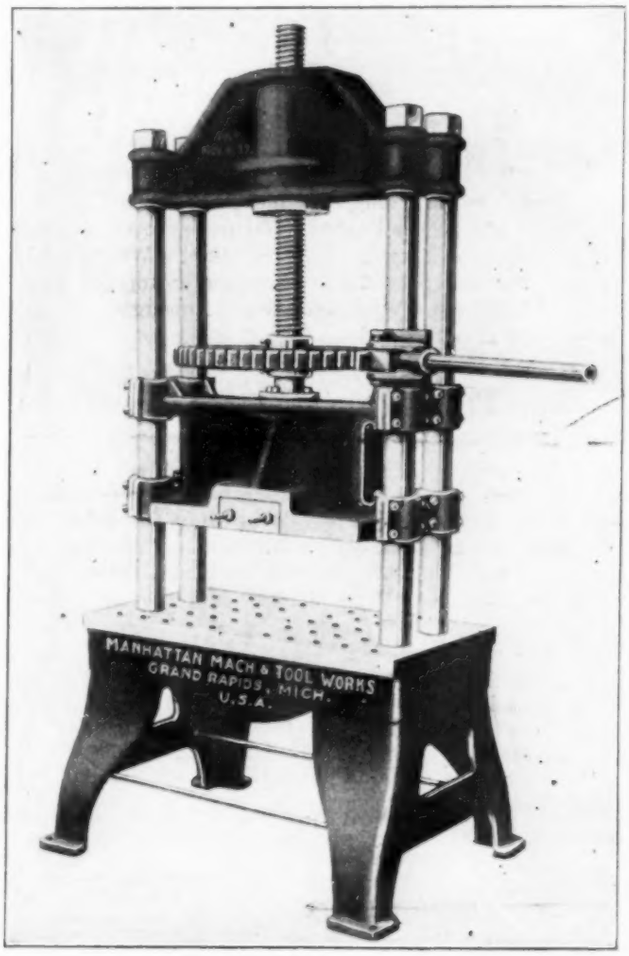
HOOSIER 20-IN. VERTICAL BACK-GEARED DRILLING MACHINE WITH POWER FEED

Specifications: Distance; column to center of spindle, 10½ in. Maximum distance, spindle to table, 27 in.; spindle to base, minimum, 32 in.; maximum, 41½ in. Travel of spindle, 9¼ in. Hole in spindle, No. 3 Morse taper. Diameter of table, 16 in. Travel of table on column, 18 in. Number of spindle speeds, four on plain-drive machine, of 90, 141, 228 and 560 r.p.m. Speeds of back-geared machine, 8; range of speeds, belt drive, 90, 141, 228 and 360; with back gears, 14, 25, 41 and 65 r.p.m. Number of power feeds, three, 0.003, 0.005 and 0.008 in.

lever feed. The No. 2 machine is similar to the No. 1 except that it is fitted with a rectangular base, and the No. 3 is the same machine with the addition of a combined lever and worm feed. The No. 4 has back gears and power-feed and is designed for heavy-duty service. The spindle is equipped with a high-grade ball-thrust bearing and is counterbalanced by a weight in the column. The spindle sleeve is graduated. The machine is provided with eight speeds, four of which are obtained without, and four with, the use of the double back gears. It also has three power feeds in addition to the hand-screw and lever feed. An automatic stop attachment is arranged in connection with the graduated spindle sleeve which is of service to the operator in accurately drilling or boring to depth. The hole in the center of the round table is machined in alignment with the spindle so that it may be used for piloting a boring bar if it is desired to use the machine for such work.

Manhattan Four Post-Screw Press

The Manhattan Machine and Tool Works, Grand Rapids, Mich., is placing on the market the type BB four-post screw press shown in the accompanying illus-



MANHATTAN TYPE BB FOUR-POST SCREW PRESS

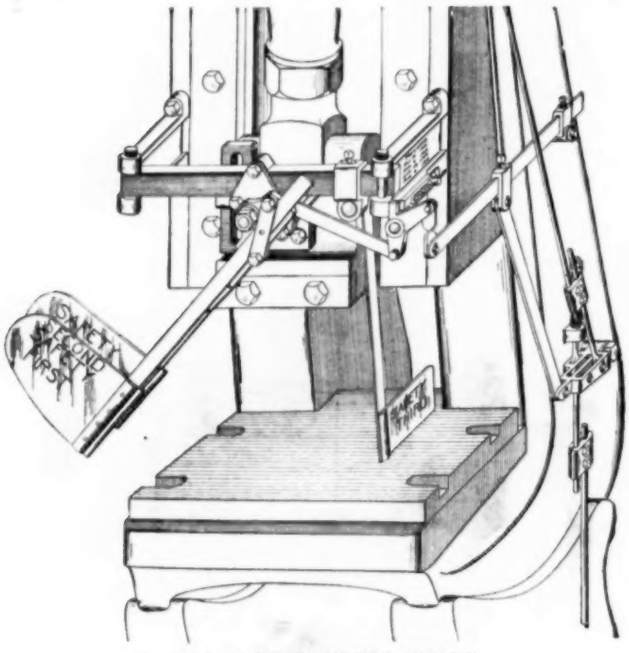
Specifications: Capacity, 80 ton. Bed; size 20 x 36 in.; thickness, 8¾ in. Standards; space between, 26 in.; diameter, 3 in. Maximum distance bed to ram, 22 in. Diameter of screw, 3 in. Height; over all, 77 in.; floor to bed, 24 in. Floor space, 31 x 41 in. Weight; net, 2,270 lb.; for shipment, 2,425 lb.; boxed for export, 2,600 lb. Cu.ft., 58.

tration. The press is intended for testing punches and dies and for other experimental work where a hand press having more than usual power is required.

D. & M. Safety Press Guard

The safety guard shown is intended as a protection to the power-press operator, and is a product of the D. & M. Guard Co., 6 State St., Rochester, N. Y. The device has three guards that are arranged to swing independently in proper time with each operation of the press. Normally, two of these guards stand at the left of the operator. The outer guard labeled "Safety First," moves with each stroke of the treadle, while

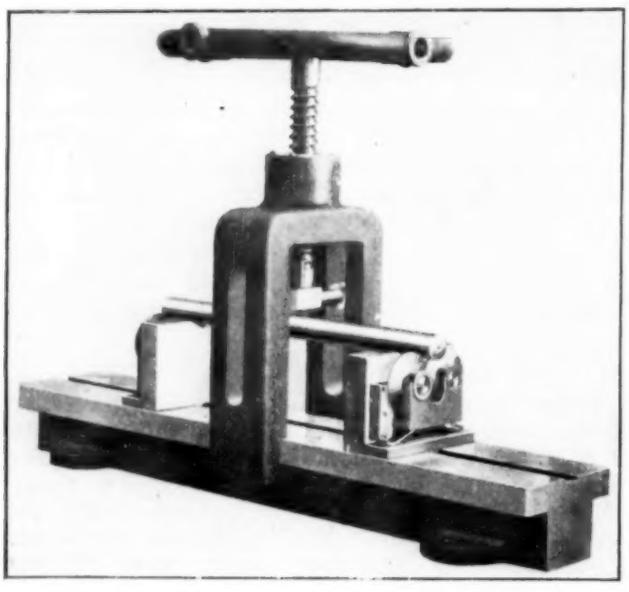
the inner guard, "Safety Second," moves with each stroke of the ram. Each moves independently of the other and serves the same purpose of pushing the operator's hands to one side. If the ram repeats unexpectedly from any cause the inner guard kicks with a quick movement as it moves faster than the ram. As a further safety measure a blinker, or side guard, labeled "Safety Third," prevents the press from being fed from the side. The bridge carrying the three guards is hinged and fastened by a pin and padlock. When unlocked the bridge may be swung to one side, making the pitman, press head, etc., accessible. The device is said to be easily attached to a press.



D. & M. SAFETY PRESS GUARD

Whitney Straightening Machine

The Whitney Metal Tool Co., Rockford, Ill., has recently introduced the straightening machine shown. It is designed to straighten bar stock up to 2 in. in diameter. The work is supported on V-blocks while being subjected to the action of the screw. Upon elevating the screw, the two sets of spring-actuated rolls lift the bar above the V's, so that it may be easily rotated.

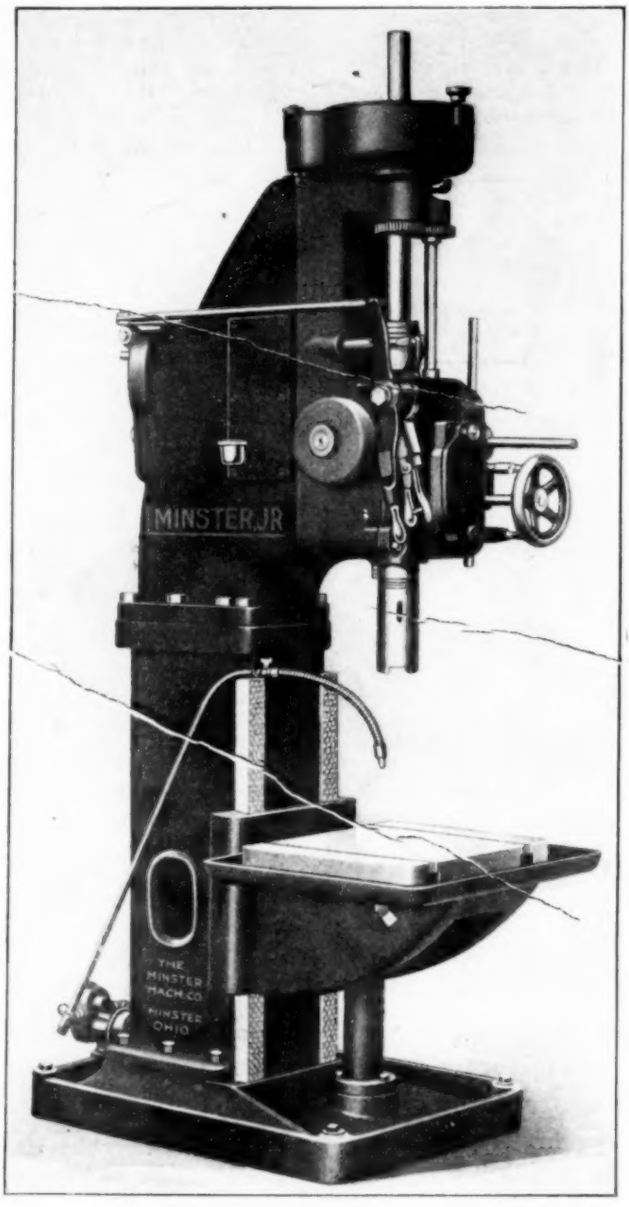


WHITNEY STRAIGHTENING MACHINE

Minster Junior Drilling Machine

The Minster Machine Co., Minster, Ohio, has brought out the drilling machine illustrated herewith and known as the No. 12 Minster Junior.

This machine is simply constructed with as few parts as possible and is intended for use on quantity production. Power is transmitted through hardened stub-tooth transmission gears. The sliding gears for changing speeds have rounded teeth. The feed is



MINSTER JUNIOR DRILLING MACHINE

Specifications: Will drill in steel, 2 in. Spindle to face of column, 12½ in. Length of feed, 16 in. Spindle to plain table, 32½ in.; to compound table, 28⅝ in.; to base, 46⅜ in. Plain table, size, 18 x 20 in.; vertical adjustment, 16 in. Feed changes, four. Speed changes, six. Net weight, with plain table, 2,800 lb.; with compound table, 3,200 lb.

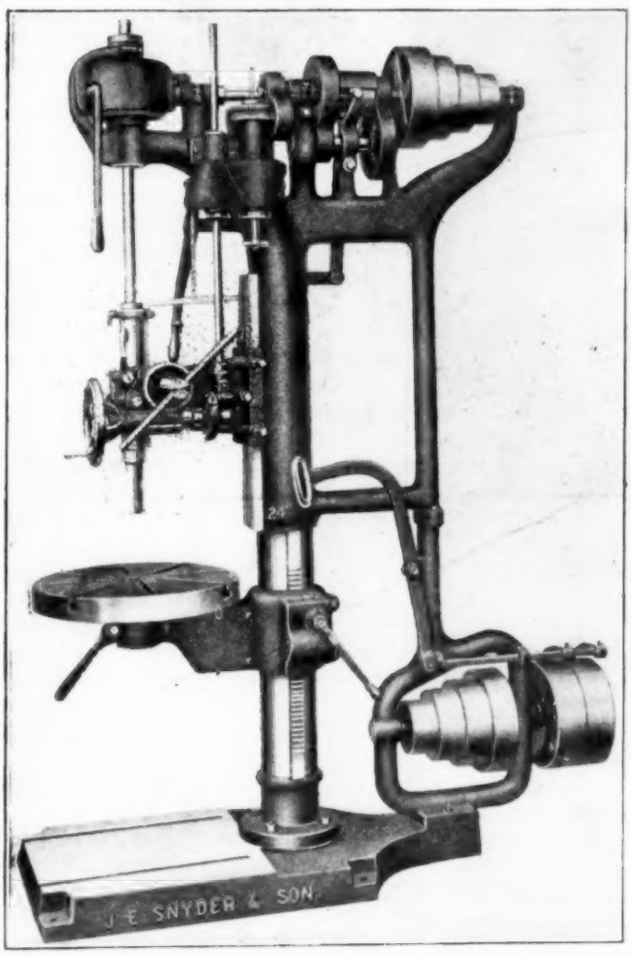
through gears contained in a gear box. The machine is regularly equipped with two sets of speed change and one set of feed transposing gears. Sets of gears giving varying speeds and feeds can be supplied. The depth of feed is controlled by a dial which, when set for the desired depth, will disengage the feed when it reaches the zero mark.

The spindle is driven by gears through a driving sleeve having two keys set diametrically opposite each other for dividing the strain. The thrust is taken by a ball bearing.

The machine is regularly equipped with tight and loose pulleys, but provision has been made for attaching a reversing clutch when the machine is to be used for tapping as well as drilling. Provision has also been made for attaching a motor. Either a plain or a compound table can be furnished. The tank for cutting compound is located inside the column.

Snyder 24-In. Drilling Machine

The upright drilling machine illustrated herewith is a recent product of J. E. Snyder & Son, Worcester, Mass. The machine has an adjustable head and tapping attachment and is designed for medium work. It can be furnished with motor drive, belt or chain connected. A compound table is furnished when required. All gears are protected and the power feed is driven from the top shaft instead of the main spindle. The crown bevel gear is 8 in. dia. and the hub runs in a solid cast-iron bearing.



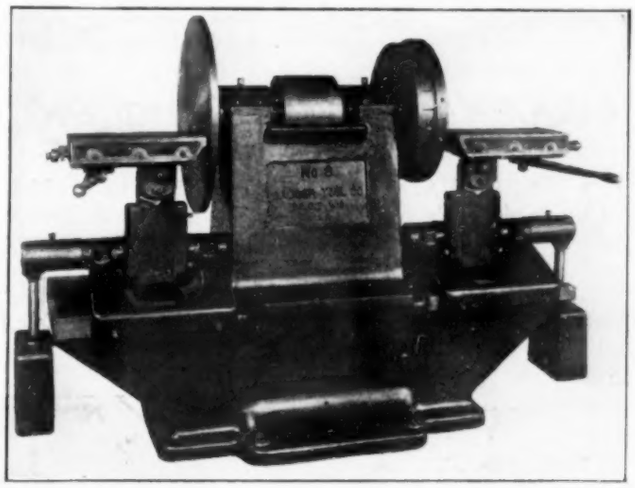
SNYDER 24-IN. DRILLING MACHINE

Specifications: Capacity; drills to center, 24 in. Maximum distance; spindle to base, 48 in.; spindle to table, 41 in. Automatic feed, 10 in. Traverse; head on column, 17½ in.; table on column, 17 in. Diameter of table, 21 in. Hole in spindle, No. 4 Morse taper. Floor space, 22⅝ x 64 in. Ratio of back gears, 5¼ to 1. Speeds; 8, 22 to 430. Feeds; 4, 0.004 to 0.017 in. per rev. Motor, 2 hp.

Badger No. 8 Disk Grinding Machine

The Badger Tool Co., Beloit, Wis., has added to its line the disk grinding machine shown in the accompanying illustration.

The machine embodies the general principles of design that have been found successful in other sizes. The rockshafts are carried by saddles sliding on extensions cast integral with the base. The sides of the extensions slope at an angle of 10 deg. forming slight dovetails to which the saddles are adjusted by gibs. The spindle runs in ball bearings. The work tables are provided with lever feed and stops having micrometer adjustment. A pump and hoods for wet grinding can be furnished and the machine can be equipped with chucks for abrasive cylinders in place of disks.



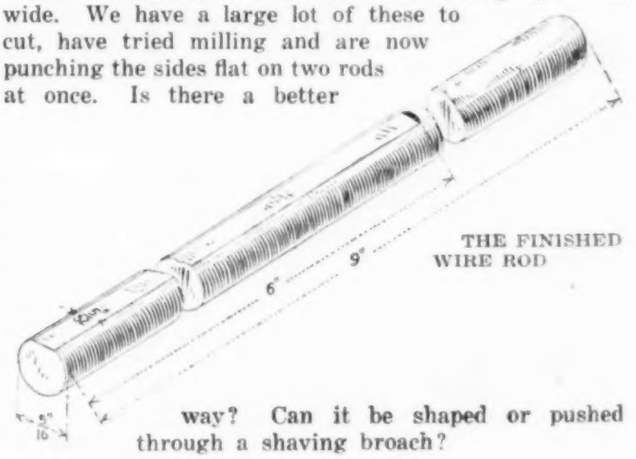
BADGER NO. 8 DISK GRINDING MACHINE

Specifications: Disks, 26 to 30 in. dia. Cylinder chucks, 18 to 20 in. dia. Speed; with disks, 6,000 ft. per min.; with chucks, 5,000 ft. per min. Work tables 8 x 15 in. Shipping weight; domestic 4,000 lb.; export, 4,500 lb. Export box, 130 cu.ft.

Is This a Punch-Press Job?

BY F. C. HUDSON

Which is the best way to cut a flat on the wire rod as shown in the illustration? The rod is 9 in. long, ⅜ in. in diameter and the flat is 6 in long by ½ in. wide. We have a large lot of these to cut, have tried milling and are now punching the sides flat on two rods at once. Is there a better way? Can it be shaped or pushed through a shaving broach?



THE FINISHED WIRE ROD

WHAT *to* READ —*for the man in a hurry*

Suggested by the Managing Editor

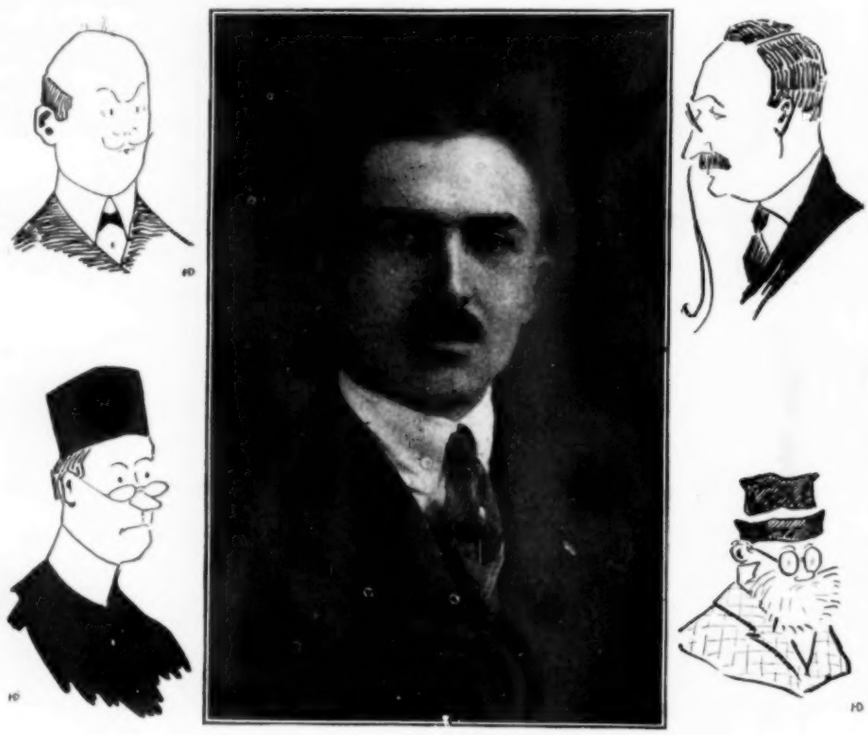
"ROLLER-CHAIN" is the title of the article which begins this issue. The methods of manufacture described include exemplifications of some very cleverly performed operations.

In the third installment of his treatise on testing high-speed steels, A. J. Langhammer gives details of the extremely careful preparation for the tests and tabulates the performances. Such a test, with all tools having exactly the same size and shape, and tested under exactly the same conditions, is a valuable contribution to anyone's high-speed steel data—page 1227. Routing will always retain its importance as a factor in plant operation and management. There are five pages, beginning with 1231, devoted to this subject. The author is J. A. Urquhart, who deals with the system used by Brown & Sharpe. Francis W. Shaw's short article, "A Question in Etymology," page 1236, presents the English point of view on nomenclature of machine tools, cutting tools and operators.

More of Western Editor Hunter's manufacturing data—this week the conclusion of his series on "The Manufacture of Single-Cylinder Gasolene Engines."

We present on page 1241 another of the series of "Interviews with Men Who Know Conditions"—this week B. B. Quillen of the Cincinnati Planer Co. For the reader who wants to check his own conclusions on many subjects—watch these interviews.

One of our staff artists has been making sketches of Chesla C. Sherlock, as he imagined him to be. The various subjects treated from time to time seemed to change the artist's impression. We give, surrounding the photograph on this page, four of his efforts; they differ one from the other, but have in common certain characteristics indicative of the serious-minded scholar. The photo shows Mr. Sherlock "as is" and puts an end to speculations. It also more intimately acquaints the reader with the man who wrote "Knowing Your Insurance Policy," the fourth section of which begins on page 1246. Our automotive construction this week is the first of two articles on "Machining the Liberty Crank Case," by H. A. Carhart. The second will follow in an early issue. Page 1247. Readers in seaport cities—the second column on page 1252—doesn't the unit container idea strike you as pretty good?



CHESLA C. SHERLOCK

As promised last week—we have the extracts from Foreign Trade Convention addresses—page 1258; and the second half of William H. Barr's' "Labor and Industry," page 1256.

In our "What Other Editors Think" page we have culled from *The Electric Furnace* the editorial, "A Short Cut to El Dorado." It says: "Every father's son of us is seeking a short cut. We want contentment without paying the price of weary miles of striving to achieve it." See page 1273.

Service of the Business Press to Foreign Trade*

Many American manufacturers have devoted too little of their time to consideration of the importance and value of foreign trade to themselves, and to American commerce and industry. Education and service are needed and the business press stands ready to do its share in providing both. Mr. McGraw's address gives some hint of what may be expected along this line from the business papers under his control.

FOREIGN trade to hundreds of manufacturers in this country has been a name only. It is trite to say that the average American manufacturer has thought only in terms of his domestic business for so long that it is usually the exception, rather than the rule, for him to be thoroughly familiar with his opportunities and his responsibilities with regard to foreign trade.

It is because the National Foreign Trade Council has seen its opportunity to help lead and mold public opinion in the development of a foreign trade policy for American manufacturers that I see the particular opportunity for its partnership with the business press. The development of a better understanding of our foreign trade needs and our foreign trade responsibilities is an educational movement, and through the medium of the business press the manufacturers may learn in detail in their several industries, something of the opportunities for trade extension in their particular fields.

Newspapers have been and are performing a splendid task in developing a better public appreciation of our general responsibilities in foreign trade, but the industrial public, the manufacturers, the engineers, the merchants of our country, want to know how they can take advantage of the general opportunities which the National Foreign Trade Council has so definitely urged.

There are two broad classes of business journals in this country which are functioning to help meet this great problem. First, there are those journals published in this country whose circulation is primarily in the United States. It is the function of these journals to take up the problems of the American manufacturer as an exporter of goods in connection with the other problems that they present to him, and this large group of business papers can do much to arouse the manufacturer to his opportunities in the foreign field.

Then there is a large group of journals which are published in this country, but are presented from the viewpoint of the foreign buyer and the importer in other countries, whose circulation is found in the countries outside of the United States. These papers are printed in different languages, and concern themselves fundamentally with the problems of the buyer of American goods, rather than with the problems of the seller of American goods.

Three Functions of the Business Press in Reference to Foreign Trade

There are three directions in which the business press can function in reference to foreign trade. It can

1. Assist in awakening the business man to the effect of foreign trade as a stabilizer, and of its necessity as an outlet for indefinite increase of our industrial production;

2. Gather and publish information regarding the conditions in foreign lands which affect our trade opportunities; and

3. Spread the knowledge of American goods in foreign lands.

The need for exercising the first of these functions—the awakening of the business man to the stabilizing effect of foreign trade and of its necessity as an absorbent of surplus production is still one of very great importance indeed. It has been the theme of many a paper before foreign trade gatherings. Nor is it necessary to emphasize again the reason why the business press has a special mission in this regard. That has been amply developed in the introductory remarks to this paper.

It is pertinent to point out, though, that foreign trade will never become the factor it should be in the commercial life of this country until there is a "mass movement" into export trade. This must be preceded by an understanding of its importance, and then accomplished by intelligent co-operative effort. The relatively small corporatons, as well as the few dominant ones in each industry, must sell goods abroad. The mass movement should receive its greatest stimulus through the sort of educational work which the business press is particularly fitted to do. Even a business paper with as small a subscription list as 5,000 reaches far beyond the confines of the dominant corporations in its industry and is in a position to preach the doctrine of foreign trade to every organization with strength enough to engage successfully in export work.

Creation of International Thinking Necessary

Nor is educational effort along the lines of the effect and advantages of foreign trade alone sufficient to bring about the result we desire. It is necessary to awaken international sympathies and to create international thinking in all lines of business. We must break down the insular barriers in both our thinking and our action. They will not fall easily, but only after constant hammerng and bringing to bear every resource of fact and logic.

Moreover, while we are working toward the desired goal, the business press can do yeoman service in bringing heavy influence to bear on specific issues. For example, when the Appropriations Committee of the House of Representatives in February cut the appropriations for our foreign trade promotion work, the business press in every line pointed out the certain serious effect of such curtailment and urged upon its readers the expression of their views to their representatives in Congress. The need for crystallization of views on such issues will occur constantly and the business press can be counted on to do its part in unifying and securing action.

No reference will be made here to the part the business press must play in the discussion of the need for foreign investment, of the financing of foreign trade, of the necessity for a large and healthy merchant marine, or of the place of the export commission house. Obviously, discussion of such subjects is a necessary part of the only kind of foreign-trade educational campaign which can develop permanent results.

*Address by James H. McGraw, President of the McGraw-Hill Co., Inc., before the Seventh National Foreign Trade Convention at San Francisco.

Until recently, the business press has functioned mainly in relation to domestic affairs. Since 1914, however, there has been a rapid increase in the variety and intensity of business paper effort on foreign trade, and, as you well know, it has been a very potent factor in stimulating interest and activity in this trade.

There has been a very lively recognition by the business papers of the importance of foreign trade news, and slow and difficult as it has been to establish proper connections and open the necessary sources of information much has been accomplished along these lines and from now forward the task will be easier.

The reason for our former neglect of foreign trade interests is obvious enough. The vast volume of our trade in manufactured goods has, in the past, been largely domestic and our business papers, serving their field, were satisfied to act as purveyors of information regarding domestic conditions and developments only. But as American business takes on an international scope, so must the business paper expand. It will no longer do to be concerned with domestic conditions only. World conditions must be interpreted. The American manufacturer and merchant must be able to get from their business paper the same information regarding foreign trade that they get regarding domestic trade.

Already substantial progress has been made along these lines. The sources of information are various, but the leading journals are working toward reliance on carefully selected representatives. It is not the function of these representatives to uncover and report for publication specific orders that are shortly to be placed, but rather to report general conditions that effect our foreign trade and to indicate in a broad way the needs of the country along the special lines in which the particular journal is interested.

Business Press Bringing News of Development in Foreign Countries to American Manufacturers and American Buyers

One vital way in which the business press is functioning in connection with the promotion of a better understanding of foreign trade is to bring to the attention of the American manufacturers what is being done by competitors abroad who are seeking the same markets. In England today in every line manufacturers' associations have either been developed or knit closer together by the war emergencies. Following the war they have taken active steps in promoting their own export relations to other countries, and the business press has the opportunity through its foreign correspondents and the establishment of editorial offices to keep in touch with and to report these developments.

More than that, because of the close association that exists between the business press and its own clientele, there has been on occasion the opportunity to emphasize the mutual values of important export relations between our manufacturers and the manufacturers abroad. The *Dry Goods Economist*, published by the Textile Publishing Co., of New York City, for example, has had a very close relation to the development of the Irish Linen Association, and the representatives of that journal have found a unique opportunity to be the emissaries of a better understanding between the merchants of this country and the Irish linen makers.

This illustrates also the fact that because the business paper is close to its field and because it sees the necessity for making first-hand studies and investigations of situations, it has an unique opportunity for leadership in the establishment of a better understanding of export or import trade relations of our own manufacturers or consumers.

Spreading Knowledge of American Goods Abroad

The third function of the business press is to act as an advance agent for American goods abroad. In this respect, the business press already has an enviable record—a record stretching back a score of years. Business paper reading matter, as well as advertisements, is constantly stimulating sales of American goods and machinery abroad. Tales are common of even heavy machinery ordered by cable on the sole basis of a business paper description, record of performance or advertisement.

This foreign propaganda function was a byproduct, not stimulated prior to 1914. No attempt was made to secure foreign subscriptions. They were bought, not sold. Since 1914, a new attitude has developed and publishers of business papers are making and will continue to make the strongest efforts to put their periodicals into the hands of influential foreign readers.

Nor are these efforts confined to placing our American editions in foreign hands. Special foreign editions are being printed in a number of instances, while several new business papers, printed exclusively in foreign languages, have been established. The "World-Wide" numbers of the *Dry Goods Economist*, published by the Textile Publishing Co. of New York, are an instance of the first class of expansion, while *Ingenieria Internacional*, published by the McGraw-Hill Co., Inc., of New York City, a general magazine in Spanish, and *El Automovil Americano*, published by the Class Journal Co., of New York City, a magazine in Spanish devoted to American automobiles and motor trucks, are examples of publications printed in foreign languages.

Editing American Publications From the Foreign Buyers' Viewpoint

I have indicated that there are two classes of papers in this country interested in foreign trade, first, a class of domestic circulation primarily having to do with the problems of the American manufacturer and merchant as an exporter, and, second, the papers having to do with the problems of the foreign buyer as an importer. The establishment of the engineering journal in Spanish, *Ingenieria Internacional*, is an example of the purpose and function of the business papers in the second group. There existed no general engineering journal in Spanish before the establishment of this paper. Eminent engineers in Spanish-speaking countries had pointed out that they would welcome a journal which took up fundamentally the engineering problems of their country, and they indicated that the industrial development of their nations rested in no small way on the engineering development of those nations. They urged that a journal having to do with the engineering problems of those countries would be of real service to them.

It was on the basis of a careful analysis and study of conditions in these countries that the paper, *Ingenieria Internacional*, was started, written not from the point of view of the American manufacturer as an exporter, but from the point of view of the Spanish-speaking engineers and industrialists as importers, and acquainting them from this point of view with the methods in their country or in the United States which would help them solve their local problems.

How intimately an engineering journal may enter into the export problems of this nation is illustrated as follows:

Buying of electrical machinery is based upon certain specifications. The standards for specifications of Germany, of England, of the United States, and of France, differ. In order that the South American engineer might know what these standards are the editors of *Ingenieria Internacional* have analyzed and are presenting in the journal, fundamental American standards, and are showing the relation of these standards to the standards of other countries, so that American electrical machinery may be bought hereafter with an understanding on the part of the South American buyer of exactly what the specifications mean.

An Example of Foreign-Trade Promotion

Still another class of foreign-trade promotion by business papers is illustrated by the editions of American papers published abroad. Of these the European edition of the *American Machinist*, published by the McGraw-Hill Co., Inc., of London, for some 22 years, is a good example.

There have been various projects for opening the Russian market with specialized magazines in Russian devoted to American methods and products, but these are necessarily in abeyance under present conditions.

American periodicals, particularly the engineering periodicals, have penetrated into many lands. Engineers the world over have certain purposes in common, and those who speak the English language have come to rely upon engineering periodicals of both the United States and Great Britain as an interchange of ideas and information on the best practise. *London Engineering*, published in London, for example, is an international paper, and several journals in the United States have a high percentage of their circulation among engineers and others abroad. *The Engineering and Mining Journal*, for example, published by the McGraw-Hill Co., Inc., of New York, reaches into practically every mining field in the world.

Conclusion

Although the great work of the business press in its relation to foreign trade has only just begun, it is safe to say that every business paper in the United States is awake to its opportunities, its responsibilities and its duty. The general recognition of these factors is already in evidence—the final form into which action will crystallize is yet to be reached. It is too true that their preliminary work has not been above criticism. But they, too, have suffered from the inertia that has characterized the general attitude of our business men toward foreign trade, though, in justice it must be said that the more progressive of them previous to 1914 tried preaching a doctrine which they knew to be sound, but which apparently fell on deaf ears. Now, with the business mind in a more receptive mood, they are improving through mutual criticism and appreciation, preaching the doctrine of the stabilizing influence of foreign trade, throwing light on pertinent foreign conditions and going forth to spread in foreign lands the knowledge of American goods and equipment.

And where American business goes, it will find the American paper already in the field.

For it is as a herald and pioneer that the business papers pledge themselves today to the service of the export trade of the United States.

Selecting the Proper Babbitt

(From an address delivered before the Automotive Service Association by H. S. Hood of the United American Metals Corporation.)

For connecting-rod service and for main engine bearings, the important qualifications of a babbitt is toughness. Lead is soft, tin is tough. A bar of good babbitt with plenty of tin exemplifies toughness, as it will bend double and not show a crack. A metal like this will take any kind of punishment with hardly a quiver. A bar of metal in which lead is predominant will bend double too; but strike the soft one against the tough one and the tough one doesn't show a mark, while the soft one has a deep dent. Hit this tough metal and it chimes like a wedding bell; hit the lead-based metal and it sounds like a muffled drum at a funeral. That's one difference between a tough metal and a soft one.

Next to a bearing pounding out or creeping out because it lacks body, the most important bearing trouble is that of running hot. There are any number of reasons for a bearing running hot, such as inferior oil, carrying particles of grit imperceptible to the eye but capable of heating the bearing by abrasion, an oil with a viscosity too light to hold the film or too heavy to make and retain one. Dust creeping into the bearing will cause it to heat. The bearing may be set too tight and so seize the shaft, or it may be set up too loose and heat up, due to the pounding that follows. But the one cause for hot bearings more than all others put together, is the using of a babbitt with too high a coefficient of friction. There are manufacturers who lose sight of the importance of bearings with a low coefficient of friction and consider only strength. They put in a babbitt considerably stronger than is necessary for the service, sacrificing the coefficient of friction for the surplus unnecessary strength.

Babbitt Composition

It is advisable to choose a babbitt only after careful analysis of the conditions under which it will be used. Lead is soft and ductile and has fine qualities for a babbitt that is not subjected to severe impact, but where pounding occurs you've got to use a babbitt with a body of tin, hardened with antimony and toughened with copper. But this is not all. A little too much antimony, even with a high tin content, will make the bearing brittle, and it may disintegrate under the impact; too much copper will make it too hard and it will run hot under slight provocation. You must have a babbitt in connecting-rod bearings (and this applies to other main bearings as well) that will not pound out under impact or pressure and will not heat up under speed. There are several different formulas that make a good babbitt for this purpose; but few people know from actual and practical knowledge which is really best, because so few have taken the trouble to find out.

Talking about formulas, let me advise you not to place too much reliance on formula alone. What I mean is, don't buy a babbitt simply because it contains so much of tin, so much of that and so much of something else. No matter how good a formula you may select for a certain service, if it is not properly and skilfully alloyed, you're going to have trouble with your bearings. Take a formula with 69 per cent of tin, 7 per cent of antimony and 4 per cent of copper, a good babbitt formula. Now antimony itself has a strong affinity for copper, and a

content of 4 per cent of copper is quite high, so that, unless the mixture is alloyed with exacting care and skill, bits of antimony will run away with bits of copper and form an amalgam known as "hardpoints." They are about the size of a pin head, or even smaller, and hard as steel. If one of these hardpoints should happen to be close to the contact surface of the bearings, it does not take much imagination to realize what will happen when the bearing wears down to the point. Many a scored shaft can lay its injury to the door of these dangerous hardpoints, if the truth were known.

Besides, unless the alloying is skilfully done, and given all the time necessary to make a perfect amalgamation, the mixture can not be uniform, and when the bearings are poured some will be high in copper and others low in copper, some will run hot because they are too hard and others will pound out because they are not hard enough. Or, what is more apt to happen, when the babbitt is melted, the copper, together with some of the antimony, will separate from the tin and hide in the bottom of the pot while bearings of nearly pure tin are being poured. Where the copper separates and settles it can be seen in the pot; but in the case of the hardpoints, or the bearings too high in copper or antimony, there is no superficial evidence to warn that the bearings are going to cause trouble sooner or later. If the babbitt was bought on formula and on a competitive price basis, you have no kick coming, because the manufacturer gave you a mixture up to the formula specified, and that's all you can expect. The wisest plan, therefore, when buying babbitt, is to buy a brand metal from a reliable house who will back up that brand to do certain work; if it doesn't, you have a come-back.

Advantage of Brand Metals

A babbitt manufacturer does not and cannot make a formula babbitt with the exacting care and skill he puts into his own brand; he cannot profitably give it the full time in alloying, because formula babbitts are keenly competitive and he must cut his manufacturing cost to quote a price that will get the order. But, if he is making a brand, and has spent a lot of money in advertising that brand to do certain work, he cannot afford to be careless, and is going to give it all possible care and attention; he is going to use the purest tin, lead and antimony. It is going to cost him more to make his brand than it would to make the same formula as a nameless metal, but he is going to get more money for it. It is worth more to you than the difference, if only for the insurance it carries.

Don't try to save money on babbitt, for if you do, you will probably lose money. Suppose you pay as much as 5 cents more a pound for a brand babbitt from a reliable house than you would have to pay for a formula babbitt on which you get competitive prices. Better to pay this than to sacrifice the guarantee with which the manufacturer backs up his own brand.

In closing, let me urge you not to underestimate the important function which babbitt metal plays in industry. Should you at any time run up against a bearing problem, seek the advice of a babbitt expert. The modern babbitt manufacturer will be only too glad to advise you.

The man who will not listen to Safety rules may have to listen to the sound of the ambulance, says the National Safety Council.

Two Unique Toolposts

By Charles H. Willey

A somewhat unique toolpost that was gotten up to hold bar forming tools on the cross slide of a turret lathe is shown in Fig. 1. The object of its design is

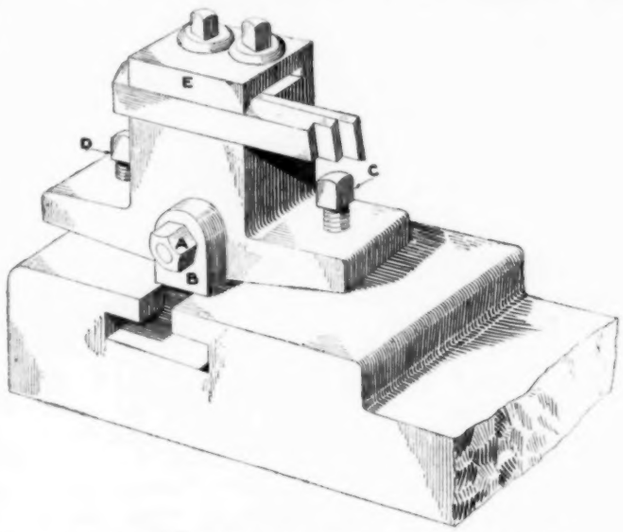


FIG. 1. TOOLPOST FOR THE SCREW MACHINE

to secure adjustability for height as well as to bring the tool close to the face of the chuck. Rigidity, simplicity and cheapness are also attained.

The block is held by pivot screws, one of which is shown at *A*, passing through lugs upon the part *B*, which fits into the T-slot of the cross-slide. The height of the cutting edge is adjusted by tilting the block by means of the setscrews *C* and *D*.

The bevelled clamp *E* fitting over the correspondingly bevelled corner of the tool shank draws the latter back against the shoulder and holds it down at the same time by simply tightening the two collar headscrews.

In Fig. 2 may be seen a quick clamping toolpost for the lathe. The hinged finger *A* gives more rigidity to the lathe tool and eliminates a great deal of the troublesome chatter due to the tool not being clamped down near its cutting edge.

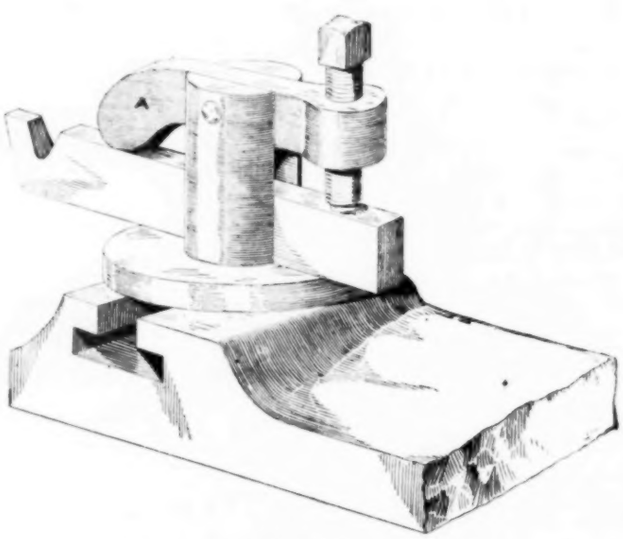


FIG. 2. TOOLPOST FOR THE LATHE

What Other Editors Think

A Short Cut to El Dorado

From *The Electric Furnace*

WE all do it. It is just as much a great National game as Base Ball or the Old Homing which Ellis Parker Butler talks about. Every one of us has tucked away inside of him a Goal which he firmly believes would represent perfect satisfaction and success, could he but attain it. Fortunately for us, although we may keep the Path, we never do reach this Goal. Every worker, be he engineer or manufacturer, sets some such goal ahead of him and bends every effort to reach it; then, when he nears it, he moves it still higher and higher, and plods on. In the good old days this was in a large measure the secret of American progress. A man was willing to follow the Long Road because of the reward at the end of the trail.

Nowadays all this is changed. Every father's son of us is seeking a Short Cut to El Dorado. We want contentment without paying the price of weary miles of striving to achieve it. We forget that contentment is appreciated only by the man to whom hardships have repeatedly come.

The War started the new order of things. Officers for the army had required a lifetime of preparation before, but now they were produced over night by the Plattsburg plan. If engineers were scarce, six weeks at any university turned out the expert required. Even music took the short cut and substituted clanging jazz for the quietier stimulus of the oratorio or opera. People wanted all the chords to strike the ear at once; they wanted a lively sensation and they wanted it in a hurry.

Even the colleges have fallen in line with this dangerous tendency. Because in the wartime a student was trained to do a particular job in a few weeks, now the university is seeking to give tabloid courses to meet all demands. They are talking of teaching only essentials, so that industry may have plenty of college trained minds in short order.

Grant, if you will, that this modern tendency is producing students who are fitted for a specialized industry. Of what benefit is such a student, either to himself or his employer, in case some business conditions or personal inclination forces him to change his occupation? He has no grounding in fundamental things. Industry has no use for such a man because he cannot adapt himself readily or efficiently to new work.

No doubt every post-bellum period experiences such troubled times as these. When 1920 is being studied as history by a class in North Somewhere High School, probably the instructor will point out that these dangers were purely psychological and that the old world was, as ever, very sound at the core. Nevertheless, we who live, move, and pay the landlord in this year of uncertainty, cannot keep from longing for the day when a sign "No Thoroughfare" will be nailed up over the Short Cut to El Dorado. The old way was longer, but it was a great deal safer and surer. Let us keep the Goal, but never be afraid to spend the time necessary to reach it. To El Dorado, there is no royal road.

Food Dangers Ahead

From *Manufacturers' Record*

IN WASHINGTON some people have been suggesting that, in order to reduce the cost of foodstuffs, an embargo be placed on exportation of grain and meats. Do these people not realize that the moment the price of farm products is driven down below the cost of production the farmer will steadily decrease his cultivated acreage and hasten the day when a food famine, greater than the public has any conception of, will be upon us?

It is absolutely certain that this year's food products will be very short. The winter wheat crop is 33 per cent short of last year's yield, and the rye crop shows, by present indications, about the same decline. Other crops will be short, for farm labor is not available.

We have ignored the farmer's needs. We have yielded to the demands of industrial workers for an eight-hour day and given them steadily advancing wages, and we have told the farm laborer that by quitting his job and coming to the city he can cut his hours of labor almost in half and at least double the amount of wages received.

Can anyone imagine that the farmer boy will continue to work with the drudgery of farm life from daybreak to dark when, by leaving the farm, he can get twice as much pay for half the hours of work, and then have all the allurements of city life?

And then, when one talks about an embargo on shipments of foodstuffs, does he realize that the farmer will have something to say on that subject and will demand his rights so that no embargo shall be placed on his product unless an embargo also be placed on cotton and iron and steel and lumber and everything that we are now exporting? What is sauce for the goose will be equally good sauce for the gander.

He who talks about an embargo on the shipment of farm products in order to reduce the cost of foodstuffs for the American people is only arguing in favor of a famine of food which would stagger the nation.

For many years, due to the trend of the population from the farm to the city, there has been in evidence a decline in the per capita production of food, and the end is not yet in sight. We are facing a very dangerous food situation, and the best brains of the nation should be concentrated upon the development of agriculture that it may be made as prosperous as merchandising and manufacturing in the city, so that the farm laborer may get as high wages as the city laborer, relative to the cost of living, or otherwise we soon will reach a point when we shall have to search the world for food to add to our own scanty production. And yet we have a soil which in extent and fertility ought to be able to feed five times our present population, but it will not feed our existing population unless the country soon comes to a realization of the whole situation and ceases to fight a profitable price for the farmer, and, on the contrary, does all in its power to make farming profitable and to lessen the burden of farm life. In that is our only safety.

SPARKS FROM THE WOR

Valentine Francis

Seventeenth Meeting of American Iron and Steel Institute

On Friday, May 28, 1920, over six hundred members of the American Iron and Steel Institute gathered in the grand ballroom of the Hotel Commodore, New York, for the seventeenth general meeting of that organization. The meeting lasted all day and was divided into three sessions. The morning session was opened by an address by Judge Elbert H. Gary, president of the Institute. Mr. Gary's words carried a forceful message to the steel makers of the country. In his extemporaneous remarks leading up to his prepared speech, Judge Gary referred to the faithful service of the iron and steel interests to the country during the war.

"Now, again," he added, "we are passing through a critical period, but you have your place and influence and you may be depended upon to carry on the work which is laid out by the necessities of the occasion in protecting the people and business of the United States.

"Again you are called upon to 'play the game and play it fair.' You will respond and you will exert great influence as steady and loyal citizens to protect your own interests and those of your associates and your employees, and above everything else the public welfare."

The full text of Mr. Gary's address will appear in an early issue of the *American Machinist*. A paper prepared by C. L. Close, manager, Bureau of Safety, Sanitation and Welfare, U. S. Steel Corporation, was read. Mr. Close traced the history of the steel industry to its present stage, bringing out particularly the absence of the human side of business in the early days. He brought out the many improvements which present day management has made to benefit working conditions for employees.

Safety devices, first aid hospitals, shop papers, insurance, community dwellings, clubs, restaurants and many other advantages which were lacking in the olden days, have been established in nearly all large corporations. Moving pictures of the social activities at the Gary Steel Works, were shown on a screen.

The afternoon session was opened with an address, "Fatigue of Metals Under Repeated Stress," by H. F. Moore, research professor of engineering material in the University of Illinois, Urbana, Ill. Mr. Moore's address covered the tests of metals as made by the National Research Council. His remarks were accompanied by lantern slides showing the effects of certain kinds of stress on steel.

F. C. Cottrell, assistant director, Bureau of Mines, Washington, D. C., spoke on "The Future of Oxygen Enrichment of the Air in Metallurgical Operations." Mr. Cottrell spoke of the recent improvements made in the production of oxygen and the tests being conducted at present to discover quicker and cheaper methods of producing this valuable gas.

Following this came addresses by Albert Sauveur, professor of Metallurgy, Harvard University, on "The Microscope and the Heat Treatment of Steel"; C. A. Witter, of the Provident Engineering Co., Philadelphia, Pa., on "A Method of Producing Pipeless Rolled Products from Annular Blooms"; B De Mare, of the Midvale Steel and Ordnance Co., Philadelphia, Pa., on "The Acid Open Hearth Process."

The evening session was taken up with a banquet in the grand ballroom of the hotel. Several impromptu speeches were made by various members who were called upon by President Gary.

Lieutenant Jean Jean's Mission

Lieutenant Jean Jean, formerly of the Construction Metallique, has returned to the United States and is now located in the machine-tool section, Office of the Director of Sales, Room 2504, Munitions Building, Washington, D. C.

Lieutenant Jean Jean is in the United States on a special mission for the Belgian Government and is not at this time making purchases of machine tools of any description. Because of the present rate of exchange the Construction Metallique is not buying machine tools or materials of any nature.

Summer Course in Management

The Department of Industrial Engineering of Pennsylvania State College, State College, Pa., is offering, for the fifth consecutive year, a two-weeks' summer course in industrial organization and management to extend from Aug. 9 to 21. There are to be included courses on factory employment, industrial betterment, planning and production control, purchasing, cost accounting and kindred subjects. Edward J. Kunze is head of the department.

Aëronautic Committee Advises Use of Duralumin

The National Advisory Committee for Aëronautics, at its recent semi-annual meeting, acted favorably upon the recommendation of the committee on materials for aircraft and adopted the following resolution:

"Resolved, That the executive committee be instructed to communicate with various manufacturing companies, inviting their attention to the importance of duralumin products, especially tubing, for airplane wings, and endeavoring to secure their co-operation in the development of duralumin products for airplanes."

It is considered to be a highly essential matter that duralumin and similar wrought aluminum alloys, as well as aluminum castings alloys, be made available for military use. It is also anticipated by the metallurgical experts that a large commercial future can be expected for these materials, not only in commercial exploitation of airplanes, but also in automotive construction and in other industrial work where strong, light alloys are much needed.

Metal parts of Zeppelins were made of aluminum alloys and the later ships were all of duralumin. In the United States a small amount of duralumin metal has been produced in simple shapes, while in England, France and Germany the production has been carried to almost all conceivable wrought shapes.

For example, Fokker all-metal airplanes have duralumin wing coverings replacing fabric, duralumin frame work in various welded and formed shapes and duralumin tubing for the supporting members, this tubing reaching about 3 in. in diameter.

Exposition and Convention of American Steel Treaters

In the Commercial Museum, Philadelphia, the annual exposition, convention and sales market of the American Steel Treaters' Society will be held. The event will run for five days, Sept. 14 to 18. Plans are being made to make this a banner year in the history of the society and from the present indications it will be more than successful.

While the booths containing the exhibitions will be situated on the main floor, the conveners will meet in another part of the building. An excellent program, covering all phases of heat treating, has been arranged and several prominent engineers and manufacturers will address the convention.

LD'S INDUSTRIAL FORGE
News Editor

Duplicate of Express Receipts Required

On and after July 1, the American Railway Express Co. will keep a duplicate copy of every receipt it issues when receiving business from shippers. The duplicates will be retained by the express company for the purpose of record and reference, and will be held at the shipping office.

Shippers who have been accustomed to prepare their own receipts or who have their own forms have been requested to make provision for supplying duplicates of such receipts to the express driver or receiving clerk who signs them.

As a matter of convenience to shippers, the regular receipt forms of the express carrier will be revised to permit their use in duplicate form.

In cases where prepaid receipts are now being issued in duplicate, the extra copy being used as a record of charges paid, a third copy will be required under the new system, and in such instances prepaid receipts will be issued in triplicate.

One of the objects of the new system is to bring about better protection for and methods of recording the movement of express packages in transit.

N. Y. State Industries Not to Hire Farm Labor

Industry in New York State will refuse to hire farm help to work in factories or mercantile establishments. The board of directors of Associated Industries of New York State, the largest employers' state association in the United States, went on record as opposed to the employment by manufacturing and mercantile institutions of farm labor, and recommends to every member of the association and to all other employers, that they refrain from advertising for, or hiring, farm labor.

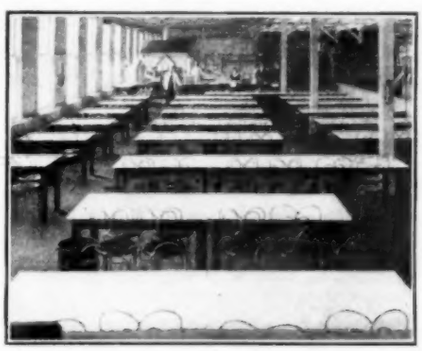
"One of the most important and pressing problems we face today," says E J. Barcalo, of Buffalo, president of Associated Industries, "is quantity production in foodstuffs on the farms. For the public generally it is more important than any problem facing industrialists. The position of the state association is obvious. We want our members to flatly refuse to hire farm help and, so far as possible, send back to the farm such experienced farm labor as has been lured by high wages into industry. It may help reduce the cost of living."

Members of Associated Industries employ more than one-half of all the factory employees in the state, the greater part of them outside of New York City in the rural and semi-rural districts. It is expected that the association's action will relieve, in some measure, the shortage of farm labor.

Latest Additions of the Black & Decker Co.

One of the latest additions to the plant of the Black & Decker Co., at Towson Heights, Baltimore, Md., is a cafeteria, a photograph of which is shown herewith.

This lunchroom takes care of over 300 employees for the noon-day meal—all being eligible to eat there, from office boy to president. A player piano and a grand piano have been installed



THE B. & D. CAFETERIA

and after the meal is over those who are musically inclined—and others—provide some amateur entertainment. This is but one of the ways which the Black & Decker Co. is taking to promote real satisfaction among its employees.

During the recent railroad strike and the embargoes immediately following, the B. & D. Co. was not to be outdone in making deliveries of its products or in getting supplies of raw materials. Two Pierce-Arrow trucks were purchased. One, a five-ton truck, has made three round trips to Fort Wayne, Ind., making stops at Pittsburgh and Cleveland. The other, a three-ton truck, has made three round trips to Cleveland, Ohio.

The Black & Decker Co. manufactures electric air compressors, portable electric drills and electric valve grinding machines.

The Wayne Machinery Co., of Fort Wayne, Ind., has opened a branch in Louisville, Ky. The purpose of this branch is to take care of the needs of the trade in Louisville, New Albany, Jeffersonville and the southern Indiana and Kentucky territory.

Foreign Credit Insurance Now a Reality

Announcement has been made of the organization of a mutual company for the insurance of credits in foreign countries. The new company is to be known as the American Manufacturers' Foreign Credit Insurance Exchange. The purpose of this mutual exchange will be to supply that element in foreign trade that has heretofore been lacking—adequate information on the financial status of foreign merchants and a reasonable safeguard in individual business transactions. Being a company organized on reciprocal lines the insurance will be written at net cost and not for profit.

This is a step in the right direction and should fill a want long felt by American manufacturers, whether at present active in export trade or interested in its potential possibilities. The question of credits—the uncertainty of the financial responsibilities of foreign merchants—is at the base of the aversion to export trade on the part of many American manufacturers and the fact that insurance on foreign credits can now be had, through a mutual company, should do much to overcome the inertia on the part of our manufacturers to cultivate the fertile and profitable markets in foreign fields.

The organization of the American Manufacturers Foreign Credit Insurance Exchange is the result of several years search by various state and trade associations, for a ways and means to solve the problem of foreign credits. At the annual meeting of the Foreign Trade Council at Cincinnati three years ago George R. Meyercord, first vice president of the Illinois Manufacturers' Association, and president of the American Manufacturers' Foreign Credit Underwriters, presented a rough plan for the insurance of foreign credits. Since then the foreign-trade committee of the Illinois Manufacturers' Association, in conjunction with associations such as the Tanners' Council, has been working to whip into shape a flexible and effective plan to provide such a service to the American manufacturer.

The net result is that there has been formed by officials of the Illinois Manufacturers' Association, and with its approval and endorsement, the American Manufacturers' Foreign Credit Insurance Exchange.

The plan and scope of insuring foreign credits through the American Manufacturers' Foreign Credit Insurance Exchange has received the endorsement of the various state and trade organizations before which it has thus far been discussed—notably the

Illinois Manufacturers' Association, the West Virginia Manufacturers' Association, the Tanners' Council, etc.

This scheme of foreign credit insurance is predicted on the necessity of the compilation and publication for foreign credit guides for the different world zones. These credit guides will be on the order of similar books published by mercantile agencies in this country in connection with domestic business. They will contain the names of the responsible importing merchants in the respective zones—names which are insurable unless otherwise marked.

Exporters may subscribe to one or more of these credit guides at a fixed rate per annum and then may insure their entire time draft or open account business with the district or districts covered, by the payment of a premium based on the volume insured. As with domestic mutual liability insurance companies, the initial payment will be determined by the normal average exports and will be adjusted at the end of the policy year by the actual transactions covered. It is understood that the basic rates will be low, ranging probably between 1 and 2 per cent. Only the solvency of the debtor will be insured for obvious reasons. However, delay in acceptance of goods or payment of bills is covered by another protective clause. When the exchange has issued as much insurance on any one consignee as his strength justifies, it will refuse to insure further shipments to him until part of the line is cleared.

The Exchange has had foreign-credit experts working for some months rating the credit files of international banking houses, similar files of export associations, credit men's associations, etc. With the sources of information at the disposal of this mutual exchange it will have information on the financial status of all foreign customers.

Of course a point that is of immediate interest and value to American manufacturers is the fact that through this mutual exchange, not only is foreign credit insurance to be brought at net cost, but in the credit guides which can be procured by members of the Exchange will be presented to the manufacturer a pre-analyzed and selected market for his product.

It is anticipated by the exchange that it will be in a position to sell insurance on specific foreign shipments by August.

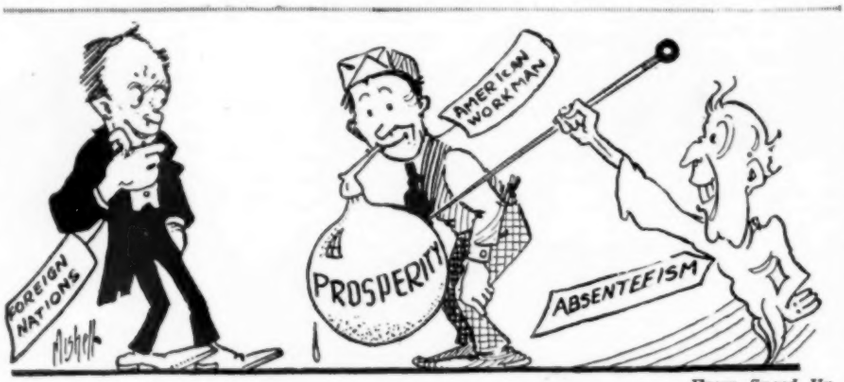
The general offices of the American Manufacturers Foreign Credit Insurance Exchange are in the Chamber of Commerce Building, Chicago.

Sponsors for Safety Codes Selected by A. E. S. Committee

Definite arrangements have been made for the formulation of a considerable number of safety codes under the auspices and rules of procedure of the American Engineering Standards Committee. The subjects of the codes for which arrangements have been completed, together with the organizations which have been designated by the committee to act as sponsors, and who have accepted such responsibility, are as follows:

ABRASIVE WHEELS.—The Grinding Wheel Manufacturers of the United States and Canada, and the International Association of Industrial Accident Boards and Commissions, joint sponsors.

EXPLOSIVES.—The Institute of Makers of Explosives, sponsor.



From *Speed Up.*

THE SIN OF ABSENTEEISM

Loss of Time Alone Cuts One-sixth of Possible Output in Country's Industries

FOUNDRIES.—The American Foundrymen's Association and the National Founders Association, joint sponsors.

GAS SAFETY CODE.—The U. S. Bureau of Standards and the American Gas Association, joint sponsors.

HEAD AND EYE PROTECTION.—The U. S. Bureau of Standards, sponsor.

POWER PRESSES.—The National Safety Council, sponsor.

PRESSURE VESSELS, NON-FIRED.—The American Society Mechanical Engineers.

REFRIGERATION, MECHANICAL.—The American Society of Refrigerating Engineers, sponsor.

WOODWORKING MACHINERY.—The International Association of Industrial Accident Boards and Commissions and the National Workmen's Compensation Service Bureau, joint sponsors.

A number of additional codes are under consideration. A large representative advisory committee of specialists, organized by the National Safety Council, the National Workmen's Compensation Service Bureau, and the Bureau of Standards, at the request of the committee, to act as its advisor, is actively working on the question of what additional codes are most urgently required and what organizations are in the best position to undertake sponsorship for such codes.

American Machinery in India

Although the Indian market for industrial machinery has been somewhat neglected by American manufacturers and exporters in the past, customs returns up to March 31, 1919, show that the percentage of machinery furnished India by the United States has annually increased from 2.3 per cent in 1914-15 to 24.5 per cent in 1918-19. Trade Commissioner Rastall comments upon this evidence of growing demand as indicative of the satisfaction given by the American product, which should encourage the further development of a strong foothold in this market by American interests.

Westinghouse Officials Decorated by the Emperor of Japan

On May 12 the Emperor of Japan decorated with the Order of the Rising Sun E. M. Herr of Pittsburgh, president of the Westinghouse Electric and Manufacturing Co., and L. A. Osborne of New York, president of the Westinghouse Electric International Co.

These American manufacturers have been several months in Japan studying Oriental industrial conditions. The company which they represent has always had close relations with Japan and has supplied that country with a great deal of power machinery. It has also undertaken the training of a number of Japanese students at its works.

The Order of the Rising Sun is the highest honor the Emperor can bestow.

Buffalo Section of A. S. M. E. Elects New Officers

The Buffalo section of the American Society of Mechanical Engineers, at a meeting held at the University Club, elected the following officers for the season 1920-1921: B. S. Hughes, chairman; W. J. Gamble, vice-chairman; W. W. Boyd, secretary; W. M. Dollar, treasurer.

Mr. Hughes is vice-president and chief engineer of the Taremba Co.; Mr. Gamble, superintendent of the Vulcan Steam Forging Co.; Mr. Boyd, an engineer with the Niagara Machine and Tool Works; Mr. Dollar, a consulting engineer.

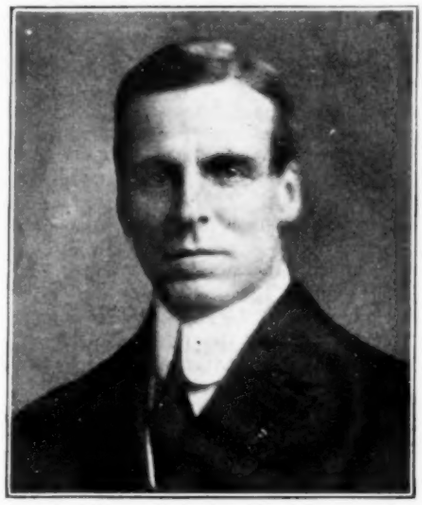
W. B. Powell, member of the A. S. M. E. and formerly chairman of the membership committee work for this section, is now president of the Engineering Society of Buffalo.

Co-operative Course Beneficial

A co-operative course in electrical engineering, which was conducted for the past year by the Massachusetts Institute of Technology and the General Electric Co., has proved a success. The company is going to enroll 60 men in this year's class—twice the number of the last one—and has secured larger accommodations for the men.

Charles N. Hess Organizes New Company

Charles N. Hess, formerly manager machinery department of W. N. Pattison Supply Co., Cleveland, Ohio, one



CHARLES N. HESS

of the best posted machinery salesmen in the Middle West, has organized the Hess-Schenck Co., to handle new and used machine tools.

Employees' Store Proves Successful

Nearly a quarter of a million dollars in cash sales was handled by the employees' store of the Westinghouse Electric Manufacturing Co., East Pittsburgh, Pa., in the first five and a half months of its existence.

According to a report just issued by J. E. Bonham, secretary-treasurer of the co-operative buying committee of employees, the total sales amounted to $226,673. After expenses for the period were deducted there remained a surplus of $11,550, which is being used as a working fund.

The employees' store has been in operation since Oct. 18, 1919, selling merchandise practically at cost to workers. It is the intention to enlarge the capacity of the store as the patronage of the employees warrants.

Business was transacted in grocery, tailoring, shoe and miscellaneous departments, more than nine-tenths of the total sales being made by the grocery department. The tailoring department sales totaled $8,113, the shoe department sales were $6,342 and $9,666 was obtained in sales of miscellaneous goods.

American Concerns in Italy Need Not Have Italian Managers

A recent newspaper dispatch from Rome stated that all American and other foreign companies possessing factories, mines, and other establishments in Italy would be compelled to assume Italian nationality, and that the head directors and managers of such companies must be Italians, domiciled and resident in Italy. The above report is not in accordance with the facts, as is evidenced by the following cable sent from Rome to Prof. B. Attolico, Italian Minister Plenipotentiary:

News published not correct. Applies only to sulphur mines, decree of July 18, 1918, and to alkaline and phosphate salt lands in which instances it is desired that concessions and assignments be made to Italian citizens. In both cases at least two-thirds of capital of companies to which concessions are made must be Italian, and administration must be retained by Italians. There is no plan to extend said dispositions to other mining and industrial branches.

Metric System Condemned

In addition to the recent order of Secretary of War Baker directing the discontinuance of the use of the metric system, the Navy Department also, through prominent officers, expresses its opposition to that system.

Admiral Griffin, Chief of the Bureau of Steam Engineering, in an interview said "that to make a change to the metric system in the Navy would cause havoc with repair work and that he had no idea Congress would be ready to make the large appropriation required to meet the cost of a change."

Admiral McGowan, at the head of the Division of Supplies, points out the serious burden which a change would place on his department.

The commandant and superintendent of the Naval Gun Factory, Washington, says, "It is not believed the time is ripe for the adoption of the metric system."

Standardization of Ball Bearings

At the request of the Swiss Standards Association, Baden, Switzerland, for co-operation in the work of standardization of ball bearings, the American Engineering Standards Committee requested the American Society of Mechanical Engineers and the Society of Automotive Engineers to act as joint sponsors for the project. These societies have accepted the responsibility and are now organizing a sectional committee for the work. The sectional committee will be thoroughly representative of all the interests involved and is the body which will be responsible for the detailed formulation of the standards.

Personals

C. C. BAUSCHKE, former Ohio representative for the Kearney & Trecker Co., has organized the Bauschke Machinery Co., to distribute several lines of machine tools.

E. W. KENYON, former Ohio representative for the W. F. Davis Machine Tool Co., and C. B. HARDING, former Eastern representative for the Lees-Bradner Co., have become associated with C. C. Bauschke Machinery Co.

FRANK A. CLARK, 603 Floyd Ave., Rome, N. Y., who has been with the Rome Brass and Copper Co. for the past 26 years, has resigned and will become associated with the National Conduit and Cable Co., of Hastings-on-the-Hudson.

GEORGE E. LONG, senior vice president of the Joseph Dixon Crucible Co., Jersey City, N. J., recently retired from that position. He has given 43 years of service, and will continue to act on the board of directors. His associates and friends hope that he will enjoy his well-earned "vacation" for many years to come.

HARRY M. FRECKER, formerly with Hill, Clarke & Co., Inc., of New York, is now connected with the New York machine sales department of the Henry & Wright Manufacturing Co., New York.

W. F. MYER has been appointed directing transmission engineer of the industrial bearings division, Hyatt Roller

Wittstein Leaves Chapman Co.

Herman L. Wittstein has resigned as works manager of the Chapman Valve Manufacturing Co., Springfield, Mass.,

HERMAN L. WITTSTEIN

to assume charge of production of the Morris Metal Products Corporation of Bridgeport, Conn. The company is engaged in the manufacture in quantity of castings, die castings and metal parts of machinery. Mr. Wittstein is best known for his work at the United States Armory at Springfield, Mass., during the war, where he was in a large measure responsible for the large production records established, and where he superintended the installation and operation of more than a half-million dollars' worth of modern ordnance machinery without diminishing the production.

Mr. Wittstein was born in New Haven, and is a graduate of the Sheffield Scientific School of Yale University.

Bearing Co., New York. In his new position Mr. Myer will be responsible for the sale of Hyatt lineshaft roller bearings.

HARRIS WHITING, formerly with Graton & Knight Manufacturing Co., of Worcester, Mass., has taken the position as factory manager of the Edward R. Ladew Co. Inc., at Glen Cove, L. I.

CLYDE E. DICKEY, president of the Dickey Steel Co., Inc., New York, has been elected first vice president and general manager of the Hammond Steel Co., Inc., of Syracuse, N. Y., manufacturer of high-grade alloy and carbon tool steels.

THOMAS A. LINCOLN, who has been connected with the New Departure Manufacturing Co., Bristol, Conn., since 1912, has advanced from fireman to foreman of the heating-treatment department of this company.

CARL HOLL, formerly with the Persons Manufacturing Co., of Worcester, Mass., is now connected with the Graton & Knight Manufacturing Co., of the same city. Mr. Holl was superintendent with the Persons Co.

JAMES H. FARRELL, formerly with the Hopkins & Allen Arms Co., Norwich, Conn., and at one time with the Yale & Towne Manufacturing Co., and also the Greenfield Tap and Die Corporation, has recently been appointed foreman of the toolroom of the New Departure Manufacturing Co., Bristol, Conn.

WILLIAM CUMPSTEY, formerly assistant foreman of general maintenance for the Connecticut Telephone Co., Meriden, Conn., has been appointed foreman of millwrights for the New Departure Manufacturing Co., Bristol, Conn.

E. J. BOGGAN, factory manager of the U. S. Metal Co., Cleveland, Ohio, has resigned his position to become sales engineer of the Dittmer Gear and Manufacturing Co., Buffalo, N. Y. Mr. Boggan was formerly production manager for the Covert Gear Co., and sales engineer for the Frontier Chuck and Tool Co., both of Buffalo, N. Y.

G. H. DAWSON, who has been plant engineer for the Remington Arms plant in Ilion, N. Y., for the last four years, has severed his connections with that firm and on May 15 will take an engineering position in the general production department of the Library Bureau Corporation, Cambridge, Mass.

JOHN KILDUFF, for the last twelve years associated with the New Departure Manufacturing Co., Bristol, Conn., has been appointed foreman of the section bearing machine department.

W. H. DIEFENDORF, A. S. M. E. and S. A. E., formerly chief engineer of the New Process Gear Corporation, has resigned the general managership of the Weekes-Hoffman Co., of Syracuse, N. Y., to establish his own gear business at 118 Dickerson St., Syracuse, N. Y., under the title of the Diefendorf Gear Corporation. The new corporation will manufacture the staple line of gears, spur, bevel and worm, in metal, rawhide and fiber or other composition. The company is capitalized at $150,000. It will manufacture special gears for the machine building industry. Mr. Diefendorf is a member of the executive committee of the American Gear Manufacturer's Association.

SIDNEY HUGHES has taken up his duties as assistant works manager of the Gilbert & Barker Manufacturing Co., of Springfield, Mass. Mr. Hughes was formerly with the Colts Patent Firearms Co., at Hartford, Conn., and has broad shop experience along engineering lines. He is a graduate of Mercersburg Academy and also of Princeton University.

AUGUSTUS S. SHORT has recently been appointed factory accountant of the Gilbert & Barker Manufacturing Co., of Springfield, Mass. Mr. Short was formerly with the firm of Fedde & Pasley, of New York.

L. M. BAKER, supervisor of sales of the motor equipment division of the Hyatt Roller Bearing Co., has resigned to take over the exclusive representation of the Ditmer Gear and Manufacturing Co., in the State of Michigan. Mr. Baker's headquatrers will be located in Detroit.

WALTER H. WOOD, assistant treasurer, of Gilbert & Barker Manufacturing Co., of Springfield, Mass., has returned home after a month spent in Florida. The southern trip did him a world of good and he finds his strength much restored.

Business Items

The New Jersey Brass Corporation has changed its address from 61 Broadway to 480 Lexington Ave., New York.

W. R. McDonough & Co., with offices in the Citizens' Bldg., Cleveland, Ohio, is now the sales representative of the Ward Tool and Forging Co., Latrobe, Pa., in the Cleveland territory.

The Chamberlain Machine Works and the Metcalf foundry, Waterloo, Iowa, were destroyed by fire on May 17. The loss is $150,000. F. L. Chamberlain, president, states that work on a new, modern factory to replace the one burned will start as soon as insurance is adjusted. The Metcalf foundry made a large amount of castings for the Chamberlain Works and other factories in Waterloo.

The American Tractor and Foundry Co., Charles City, Iowa, has changed its name to the American Engine and Foundry Co. W. J. Joyce, president and manager, states that the change is made to indicate its manufacturing business more accurately as it is not manufacturing tractors as was intended when the former name was taken.

The Rich Tool Co., Chicago, announces that the Garlock-Walker Machinery Co., Ltd., with offices in Toronto, Montreal and Winnipeg, has been appointed its exclusive agent for Canada.

E. Lagerholm Co., Inc., has announced the removal of its offices and stockroom to 9 South Clinton Street, Chicago, Ill.

The Lycoming Foundry and Machine Co., Williamsport, Pa., announces the change of its corporate name to Lycoming Motors Corporation and will continue the manufacturing of automobile motors.

The Simmons Economy Tool Corporation has started construction of a building in North Albany, N. Y. The building will be of steel construction; the floor space will be approximately 10,000 sq.ft. on two floors. Equipment of the plant will consist of the most modern and up-to-date machinery obtainable. At the start, 150 skilled mechanics will be employed. The company will manufacture and sell the Simmons hold-em-all tool holder, patents, patterns and plans of which are the property of the corporation. Other products to be made at the plant are the Simmons dividing head, Simmons patent drill socket, precision lathes, for instrument makers, drill presses, laundry machinery and a variety of machine tools.

The McKneat Manufacturing Co., a corporation organized under the laws of Pennsylvania, has leased a factory building at Easton, Pa., for the purpose of manufacturing the "McKneat" line of oil burners and equipment. The officers of the company are: C. P. Astrom, president; E. R. Euston, vice president; W. I. Gassert, secretary; A. J. McVey, treasurer; A. A. Neave, chairman board of directors.

The personnel of the Beaver Machine and Tool Co., Newark, N. J., has somewhat changed and the officers are: Ernest B. Slade, president and treasurer; Harold E. Slade, vice president and secretary; Arthur T. Doud, vice president and general manager. Mr. Doud just recently joined the organization and was formally manager of the press metal division of the American Tube and Stamping Co., of Bridgeport, Conn. Robert C. Nelson is factory superintendent, and Mr. Moore is tool room superintendent. J. Downing is chief engineer.

The Walker-Stewart Foundry Corporation, of Meriden, Conn., has been organized to deal in castings, machinery, etc. The organizers of the new company are: V. E. Walker, Amos Doolittle, J. J. Roach, H. E. Bradshaw, all of Meriden, and William Stewart of Torrington, Conn. The capital of the new company is $50,000.

The Factory and Mill Supply Co., of Boston, Mass., has taken a larger warehouse in the center of the machinery district, 390-400 Atlantic Ave., Boston, where it will have over 15,000 feet of floor space for its machine tools. The general offices and showroom will remain at Oliver and Purchase Sts.

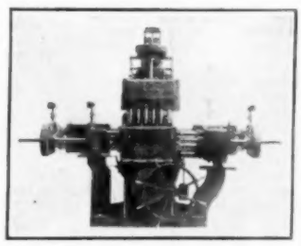
The following manufacturers announced the opening of New York offices in the Grand Central Palace, New York, in charge of L. S. Devos, formerly at 120 Liberty St., New York:

(*Continued on page 1278b*)

Condensed-Clipping Index of Equipment

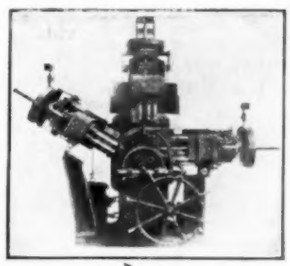
Patented Aug. 20, 1918

Tapping Machine, Three Way.
Foote-Burt Co., Cleveland, Ohio.
"American Machinist," May 6, 1920.



The drive for spindles is carried through a main shaft to a separate reduction gear in a housing on the frame at rear of each spindle head. The sizes tapped by the same spindle head may range from 1¼ to a ¼ in. hole. It is stated that the use of a large size tap in a spindle head adds to the success of results obtained from the smaller taps that may be in use at the same time, since the larger tap tends to pull the smaller ones more uniformly into the work. It is not always advisable to tap from underneath and in this tapping machine the cylinder block casting is inverted before being placed in the machine.

Tapping Machine, Combination Three Way.
Foote-Burt Co., Cleveland, Ohio.
"American Machinist," May 6, 1920.

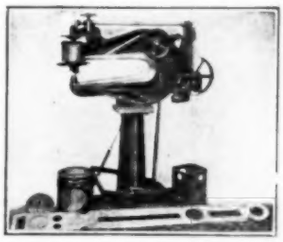


The drive for spindles is carried through a main shaft to a separate reduction gear in a housing on the frame at rear of each spindle head. The sizes tapped by same spindle head may range from 1¼ in. down to a ¼ in. hole. It is stated that the use of a large size tap in a spindle head adds to the success of results obtained from the smaller taps that may be in use at the same time, since the larger tap tends to pull the smaller ones more uniformly into the work. In this machine one inclined spindle head is shown and a cylinder block lying in fixture reveals how the machine is employed. The inclined spindle heads are each equipped with a roller running on a guide plate.

Lathe, Locomotive Crank Axle.
Fairbairns, Leeds, England.
"American Machinist." (English Edition) April 10, 1920.

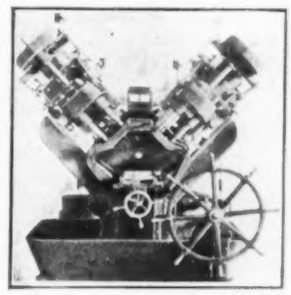
The 36 in. center locomotive crank-axle lathe takes axles up to 12 ft. in length between the centers. Bed is of the twin type, 8 ft. 3 in. across the top, bed piece up to gap being 16 ft. 6 in. long. Headstock mounted on separate baseplate, a 30 hp., 3 to 1 variable-speed motor driving through double-helical and spur gears to faceplate gear. By means of handwheel and lever the gear box at the front of the head gives three speeds. All the gears throughout the machine are of steel. The overall length of the lathe is 30 ft. and the approximate weight is 45 tons.

Shear, Gray's Rotary Turret
Southwark Foundry and Machine Co., Philadelphia, Pa.
"American Machinist," May 20, 1920.



Cuts openings of any shape without cutting in from edge and without turning sheet. Turret carrying upper cutter, while cutting, can be revolved about lower cutter. Simultaneous driving of both cutters automatically pulls sheet through shear. Line is accurately followed by turning guide wheel which controls turret. Cuts openings in widths equal to double the throat depth and without limit on length. Machine is built in five sizes. The three smaller machines will cut metal of 18, 16 and 10 gage, respectively, the two larger sizes will shear plate up to 1 in. thick. Throat depths are from 18 to 36 in.

Tapping Machine, Two Way Inclined Head.
Foote-Burt Co., Cleveland, Ohio.
"American Machinist," May 6, 1920.

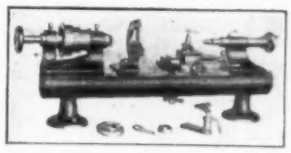


The drive for spindles is carried through a main shaft to a separate reduction gear in a housing on the frame at rear of each spindle head. The sizes tapped by same spindle head may range from 1¼ in. down to a ¼ in. hole. It is stated that the use of a large size tap in a spindle head adds to the success of results obtained from smaller taps that may be in use at the same time, since the larger tap tends to pull the smaller ones more uniformly into the work. In this machine both spindle heads are inclined at an angle of 45 deg. and are counterbalanced by weights.

Pulley, Iron Split.
The Skefko Ball Bearing Co., Ltd., Luton, England.
"American Machinist." (English Edition) April 17, 1920.

Pulley has interchangeable rims, shaft bushes, and ball bearing bushes for the conversion of fast pulleys to loose pulleys. Is made in sizes from 8 in. to 60 in. diameter, with interchangeable rims ranging in width from 3 in. to 16 in. up to 20 in. diam. With rims from 3 in. to 9 in. wide, either flat or crowned, a single spider is used, pulleys for belts of greater width having two spiders and flat-faced rims only. Pulleys from 12 to 40 in. diameter are standardized with three hub bores, 2¾, 4, and 6 in. The shaft bushes are made in 22 sizes, from 1 to 5¾ in. diameter.

Lathe, P. M. C. Precision Bench,
Package Machinery Co., Springfield, Mass.
"American Machinist," May 20, 1920.



Special features are: Ball thrust-bearings in headstock; split-nut clamp in tailstock, and adustable nuts on compound-rest feed screws. Countershaft furnished with either bench or wall hangers. Two sets of tight and loose pulleys are furnished. Large pulley for driving, is made of aluminum. Specifications: Length of bed, 36 in. between centers, 16 in. Swing over bed, 8¼ in. Collet capacity. Distance, ⅝ in. Diameter of spindle nose, 8¼ in. Thread on spindle nose, 12 per in. Speeds (6), 350 to 1,200 r.p.m. Bench space, 6 x 39 in. Weight, net, including countershaft, 235 lb., boxed 295 lb.

Milling Machine, No. 1 Hand.
Superior Machine and Engineering Co., Detroit, Mich.
"American Machinist," May 20, 1920.

Specifications: Table, surface, 22 x 4¼ in., T-slots, ⅝ in. wide; longitudinal travel, 6 in.; traverse travel of saddle, 6 in.; vertical travel of knee, 12 in. Spindle, No. 10 B. & S. taper in nose; vertical travel, 4¼ in. Overarm, 2¼ in. dia. Distance from center of spindle to underside of arm, 3¼ in. Driving pulley, dia., 10 in.; width of face, 3¼ in.; speed, 300 r.p.m. Spindle has 12 speeds, from 150 to 600 r.p.m. Speed-change pulleys, 4¼, 6¾, 8 and 9 in. dia. for 2¾-in. belt. Floor space, 34 x 41 in. Net weight, 860 lb.

Clip, paste on 3 x 5-in. cards and file as desired

Monarch Machine Tool Co., Sidney, Ohio; Whipp Machine Tool Co., Sidney, Ohio; Stockbridge Machine Co., Worcester, Mass.; Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.; Ott Grinder Co., Indianapolis, Ind.; American Milling Machine Co., Cincinnati, Ohio; U. S. Machine Tool Co., Cincinnati, Ohio; U. S. Drill Head Co., Cincinnati, Ohio; La Salle Tool Co., La Salle, Ill.; T. R. Almond Manufacturing Co., Ashburnham, Mass. A permanent demonstration exhibit as well as a limited stock of the above manufacturers' products will at all times be maintained at the Grand Central Palace.

The Gilbert & Barker Manufacturing Co., of Springfield, Mass., issues service pins to all its employees at the end of five years' service with the company. President McNall recently issued six of these to employees whose service of five years was completed in May.

The Willard Tool Co., Inc., of Stratford, Conn., has been organized and incorporated with a capital of $25,000 to engage in the manufacture of tools, etc. The incorporators of the new company are: M. W. Schillberg and F. W. Schillberg, of Stratford; and A. O. Seastrom, of Bridgeport.

The Millersburg Reamer and Tool Co., of Millersburg, Pa., recently incorporated, is erecting a shop of steel and concrete construction, which will be in full operation by July 1, 1920. W. Edward Wilt, is president; W. Shatts, treasurer, and W. Bauer, secretary.

Morey & Co., Inc., Broome and Lafayette Sts., New York, dealers in machinery and supplies, has purchased the entire equipment of the cartridge plant of the New York Air Brake Co., at Watertown, N. Y., which includes all of the large presses.

The Cutler-Hammer Manufacturing Co., Milwaukee, Wis., has removed its Chicago office from the People's Gas Building to the company's own building, 323 North Michigan Ave., Chicago. H. L. Dawson is manager of the Chicago office, which handles the business of nineteen states with sub-offices in Cincinnati and Detroit.

Obituary

WILLIAM CHAMBERS MEYERS, sales manager of the Earle Gear and Machine Co., Philadelphia, died May 3, 1920, after a short illness. Mr. Meyer was about forty years old. During the war he served as a captain in the Ordnance Department, U. S. A.

J. FREDERICK BUEL, a manufacturer of machinery and an inventor, dropped dead at his home in Woburn, Mass., on May 19, from heart disease. He was born sixty-two years ago and with his father, James Buel, invented the automatic fire sprinkler, which later developed into the Grinnell system, now used in stores and factories all over the country. He also invented an elevator.

Export Opportunities

The Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., has inquiries for the agencies of machinery and machine tools. Any information desired regarding these opportunities can be secured from the above address by referring to the number following each item.

A corporation in France desires to purchase motor trucks suitable for two-wheel trailers, four-wheel tractors hauling four-wheel trailers, four-wheel trailers, speedometers adapted to metric system, equipment and trailers with a carrying capacity of 25 to 30 tons, and rapid loading apparatus for trucks and trailers. Telegraphic quotations c.i.f. French ports are requested. Correspondence may be in English. Reference. No. 32,880.

A commercial representative in Mexico of an American firm desires to secure an agency on a commission basis for the sale of hardware and mining and machinery supplies. References. No. 32,883.

A merchant in Canada desires to purchase molders' tools. Quotations should be given f.o.b. destination. Cash will be paid. Reference. No. 32,845.

A company of ship repairers in Canada desires to purchase boiler and tank plate, boiler tubes, copper pipe, bronze fittings, pipe and pipe fittings. Quantities will not be large but needed in regular deliveries over long periods. Quotations should be given f.o.b. Canadian port. References. No. 32,888.

An agency is desired by a commercial agent in The Netherlands for the sale of wrought iron gas tubes, seamless steel boiler tubes, cast iron coated pipes for gas and water, malleable pipe fittings, and all other articles in the gas, water, steam, heating, and electrical trades. Reference. No. 32,889.

Catalogs Wanted

The Morrison Machine Products, Inc., 15 Commercial St., Rochester, N. Y., would be pleased to receive catalogs from lathe and screw machine manufacturers.

The Auto Metal Parts Co., 624-628 East Locust St., Des Moines, Iowa, would be pleased to receive catalogs for its files of metal working machinery, machine tools and small tools.

New Publications

Aircraft Year Book, 1920 Edition. 333 pp., 6 x 9, with numerous illustrations. Published by Doubleday, Page & Co. for the Manufacturers Aircraft Association, Inc., 501 Fifth Ave., New York, N. Y.

This 1920 year book of the infant industry of aviation gives a clear idea of the present condition of this much-handicapped art and also recounts the developments that have taken place in the last five years. The first chapter, on aircraft in commerce, tells what has been done in the last year in mail-carrying, record-breaking flights like that of the NC-1, forest patrol service, sport, aerial transport and airplane photography and mapping. The second chapter deals with the problems of private cross-country flying with particular attention to the vexing problem of proper landing-fields, and the third with our war record in the air. Chapters four and five give in full the international air navigation convention and the report of the American Aviation Mission. Six and seven take up technical developments in both heavier- and lighter-than-air machines and eight is devoted to the 1919 activities of the various member companies of the association. Chapter nine is a chronology of aërial events in 1919 and the fifteen parts of the appendix give voluminous statistics regarding various details of interest to those who follow the course of aërial events.

Trade Catalogs

Grinders. Wisconsin Electric Co., Racine, Wis. Catalog, 8 x 10½ in. This catalog is printed on coated stock and is divided into four sections, each one describing and illustrating the Dunmore products which are as follows: grinding machines, electric drilling machines, fractional horsepower motors and electrical appliances.

Roller Bearings. Hyatt Roller Bearing Co., New York. A two-page folder giving one solution of that high-wage problem.

Collets. Morrison Machine Products, Inc., 15 Commercial St., Rochester, N. Y. Circular, 3½ x 6¼ in. A small circular describing the ins and outs of the Inanout double-acting collet.

Hand Tachometers. O. Zernickow, 15 Park Row, New York. Circular 6 x 7 in. gives a description and one illustration of its hand tachometers.

Safety Equipment. The F. W. King Optical Co., Cleveland, Ohio. Catalog No. 12, pp. 24, 6¾ x 10 in. This catalog is a handbook of safety equipment for the protection of the eyes and heads of industrial workers. Separate price list is enclosed.

Grinders. The F. C. Sanford Manufacturing Co., Bridgeport, Conn. Circular, 8½ x 11 in. This circular describes its model "B" Sanford precision centerless cylindrical grinding machine, also a few illustrations are given.

Classified Scrap Iron is the title of a new booklet which has been compiled by Briggs & Purivas, Inc., 1309 Westminster Building, Chicago. The booklet contains a brief classification of the different grades and qualities of all kinds of scrap ferrous material; also a number of pages of tables giving tonnage weights and other items which may be of interest to the scrap man in compiling the weights of his various scrap materials.

Tool Steel. Vanadium-Alloys Steel Co., Pittsburgh, Pa. Booklet, 3½ x 6¼ in. The Vanadium-Alloys Steel Co. has issued an attractive booklet descriptive of Vasco Vanadium tool steel. This booklet contains much information of value; also suggestions concerning heat treatment, etc. Copies may be had upon request.

Grinding Wheels. Norton Co., Worcester, Mass. Catalog, pp. 22, 3½ x 6¼ in. This booklet is intended for men using or interested in the use of Blanchard vertical surface grinding machines.

Forthcoming Meetings

The Railway Supply Manufacturers Association will hold an exhibit on Young's Pier at Atlantic City, June 9 to 16, in conjunction with the annual mechanical conventions of the American Railway Association. Many of the leading machine-tool builders of the country will be among the 330 or more exhibitors.

The American Drop Forge Association will hold a meeting at the Hotel Marlboro-Blenheim, Atlantic City, N. J., on June 17, 18 and 19. E. J. Frost, of the Frost Gear and Forge Co., Jackson, Mich., is president.

The American Society for Testing Materials will hold its next annual meeting during the week of June 21, 1920, at the New Monterey Hotel, Asbury Park, N. J. This society has its headquarters in the Engineers' Club Building, 1315 Spruce St., Philadelphia, Pa. C. L. Warwick is the secretary and treasurer.

The Gas Products Association will hold its summer convention at Mackinac Island on June 21 and 22. A boat will leave Chicago on June 19 for the island. The association is composed of the leading manufacturers of electrolytic oxygen and hydrogen. D. B. McCloud, 140 South Dearborn St., Chicago, is secretary and treasurer.

The Society of Automotive Engineers will hold its annual summer meeting at Ottawa Beach, Mich., on June 21-25, inclusive.

The American Steel Treaters' Society will hold a convention in Philadelphia, Sept. 14 to 18. J. A. Pollak, of the Pollak Steel Co., Cincinnati, Ohio, is the secretary.

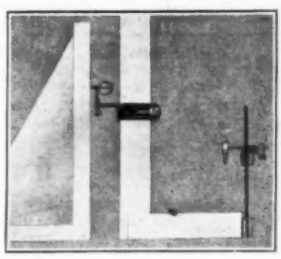
Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

Lathe, 60- 72-in. Geared Head Engine.
Betts Machine Co., Rochester, N. Y.
"American Machinist," May 20, 1920.

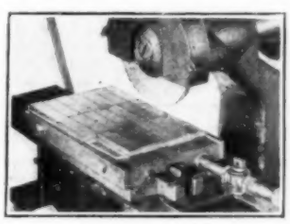
There are twelve spindle speeds in geometric progression, controlled by levers at front of headstock. Shaft bearings are bronze-bushed and are lubricated by chain oilers. There are thirty-two changes of feed and leads. Apron is of the double-wall unit-casting construction. All shafts have a bearing on each side, the gearing running in oil. Power angular feed to compound rest is driven from cross feed friction, a slip gear being provided for the cross feed or power angular feed. Both feeds and leads may be reversed either at the headstock or at the apron. Power rapid traverse operated by a lever apron.

Indicator Holder, Correct.
Guldager & Jantch Co., 460½ Lenox Ave., Detroit, Mich.
"American Machinist," May 20, 1920.



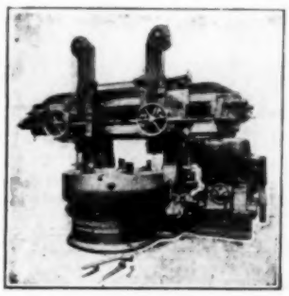
The indicator holder is made to fit the blades of squares and is adjustable for widths of blades from 2 to 3 in. Steel balls are used for sliding contacts allowing an easy movement up or down the square blade. A thumbscrew at the back is used to lock the holder in any desired location. The indicator is not included with the holder.

Chuck, Crescent Vacuum.
Crescent Sales and Engineering Co., Detroit, Mich.
"American Machinist," May 20, 1920.



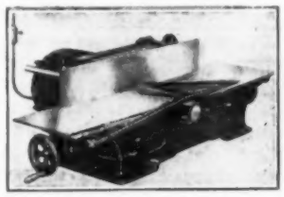
Chuck is intended for holding work that is non-magnetic and can not be held by a magnetic chuck. A series of holes in the top face of the chuck lead to a vacuum chamber in the interior, from whence connection is made to a vacuum pump. A thin gasket of soft paper placed between the work and the chuck-face is used to prevent leakage.

Mill, Railway Wheel Boring and Turning.
G. Richards & Co., Ltd., Broadheath, England.
"American Machinist," (English Edition) May 8, 1920.



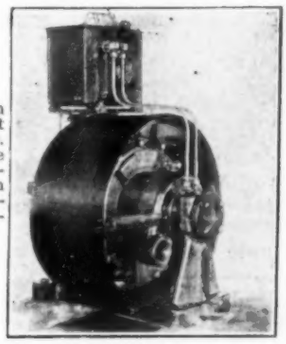
Machine admits 21 in. under cross slide and tool holders, down feed to the tool bars is 24 in. Table is 5-jaw self-centering chuck, 66 in. diam. Spindle is 14 in. diam., table supported on conical whitemetal thrust bearing, 36-in. diam., submerged in oil. Main drive is by heavy 4-speed gear box and 25 hp. motor, preferably with 4 to 1 reduction in speed. With the 4 to 1 reduction motor the table speeds are 0.48 rev. to 26.5 rev. a min. All gearing is efficiently guarded and net weight of machine is 24 tons.

Jointer, Bench.
J. D. Wallace & Co., 1401-5 Jackson Blvd., Chicago, Ill.
"American Machinist," May 20, 1920.



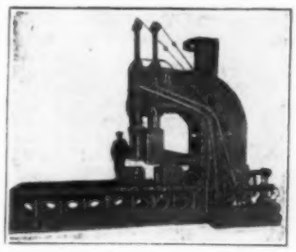
The machine is portable, the idea being to take the machine to the job, rather than the job to the machine. It is equipped with a ½-hp. motor, ball-bearings, safety cutter head, rabbeting ledge, adjustable fence and tables, flap and shutter guard, and can be operated from a lamp circuit.

Pump, Crescent Vacuum,
Crescent Sales and Engineering Co., Detroit, Mich.
"American Machinist," May 20, 1920.



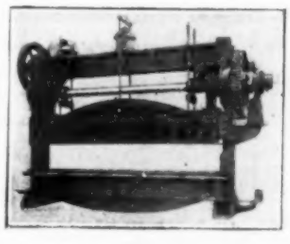
The pump is intended for use in connection with vacuum chucks but can also be used as a pressure pump. It is claimed that it will produce either a vacuum of 28½ in. or a pressure of 15 lb. The intake is through the hollow center shaft and the outlet is in the casing. The rotor revolves about a stationary shaft.

Press, Overhung Hydraulic Flanging.
Rice & Co., Ltd., Leeds, England.
"American Machinist," (English Edition) May 8, 1920.



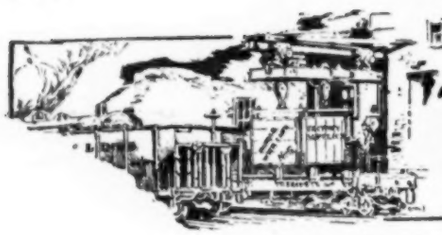
Will flange boiler plates up to 2 in. thick, 20 ft. wide. Main frame and cylinders are of cast steel, four rams are provided, two vertical and two horizontal, these for holding and flanging the plate. A five ton crane may be attached to the press by means of bracket at top of column. Length of press, 25 ft. 6 in.; width, 5 ft.; height, 19 ft. 6 in. Net weight, 50 tons.

Press, No. 10A Straight-Side.
Williams-White & Co., Moline, Ill.
"American Machinist," May 27, 1920.



Specifications: Capacity, 600,000 lb. distributed load. Clear distance between housings, 16 ft. Vertical die space with ram down, 24 in. Length of stroke, 5 in. Normal speed, 25 strokes per min. Width of table, 24 in. Width of ram, 16 in. Pneumatic counterbalance operates at 80 to 100 lb. pressure. Motor, 50-hp., d.c., direct connected. Speed, 775 r.p.m.

Clip, paste on 3 x 5-in. cards and file as desired



THE WEEKLY PRICE GUIDE

IRON AND STEEL

PIG IRON—Quotations compiled by The Matthew Addy Co.:

CINCINNATI	Current	One Year Ago
No. 2 Southern	$45.60	$29.80
Northern Basic	42.80	27.55
Southern Ohio No. 2	46.80	28.55
NEW YORK—TIDEWATER DELIVERY		
2X Virginia (Silicon 2.25 to 2.75)	49.65	31.90
Southern No. 2 (Silicon 2.25 to 2.75)	49.70	33.95
BIRMINGHAM		
No. 2 Foundry	42.00@44.00	25.75
PHILADELPHIA		
Eastern Pa., No. 2x, 2.25-2.75 sil.	46@48.25*	...
Virginia No. 2	45.00*	30.85
Basic	44.50†	30.90
Grey Forge	43.50*	30.90
CHICAGO		
No. 2 Foundry local	44.25	27.25
No. 2 Foundry, Southern	47.00	31.75
PITTSBURGH, INCLUDING FREIGHT CHARGE FROM VALLEY		
No. 2 Foundry	45.65	28.15
Basic	44.40	27.15
Bessemer	44.90	29.35
MONTREAL		
Silicon 2.25 to 2.75%	43.25	...

* F.o.b. furnace. † Delivered.

STEEL SHAPES—The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses at the cities named:

	New York Current	New York One Month Ago	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Year Ago
Structural shapes	$4.47	$3.97	$3.47	$5.50	$3.37	$3.97	$3.47
Soft steel bars	4.62	4.12	3.37	5.00	3.27	3.87	3.37
Soft steel bar shapes	4.62	4.12	3.37	..	3.27	3.87	3.37
Soft steel bands	5.82	5.32	4.07	6.25	...	...	...
Plates, ¼ to 1 in. thick	4.67	4.17	3.67	5.00	3.57	4.17	3.67

BAR IRON—Prices per 100 lb. at the places named are as follows:

	Current	One Year Ago
Mill, Pittsburgh	$4.25	$2.35
Warehouse, New York	4.57	3.37
Warehouse, Cleveland	3.52	3.22
Warehouse, Chicago	3.75	3.37

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the base quotations from mill:

Blue Annealed	Large Mill Lots Pittsburgh	New York Current	New York One Year Ago	Cleveland	Chicago
No. 10	3.55-6.00	7.12@8.00	4.57	7.55	7.02
No. 12	3.60-6.05	7.17@8.05	4.62	7.65	7.07
No. 14	3.65-6.10	7.22@8.10	4.67	7.70	7.12
No. 16	3.75-6.20	7.32@8.20	4.77	7.80	7.22
Black					
Nos. 18 and 20	4.15-6.30	8.50@9.50	5.30	8.20	7.80
Nos. 22 and 24	4.20-6.35	8.55@9.55	5.35	8.25	7.85
No. 26	4.25-6.40	8.60@9.60	5.40	8.30	7.90
No. 28	4.35-6.50	8.70@9.70	5.50	8.40	8.00
Galvanized					
No. 10	4.70-7.50	9.75@11.00	5.50	8.50	8.15
No. 12	4.80-7.60	9.85@11.00	5.55	8.60	8.20
No. 14	4.80-7.60	9.85@11.10	5.60	8.60	8.35
Nos. 18 and 20	5.10-7.90	10.10@11.40	5.90	8.90	8.65
Nos. 22 and 24	5.25-8.02	10.25@11.55	6.05	9.05	9.05
No. 26	5.40-8.20	10.40@11.70	6.20	9.20	9.20
No. 28	5.70-8.50	10.70@12.00	6.50	9.50	9.50

Acute scarcity in sheets, particularly black, galvanized and No. 16 blue enameled.

Automobile sheets are unavailable except in fugitive instances, when prices are 9.45c per lb. for No. 16; 9.50 for Nos. 18 and 20, and 9.55c for Nos. 22 and 24.

COLD FINISHED STEEL—Warehouse prices are as follows:

	New York	Chicago	Cleveland
Round shafting or screw stock, per 100 lb. base	$6.25	$5.80	$6.00
Flats, square and hexagons, per 100 lb. base	6.75	6.30	6.50

DRILL ROD—Discounts from list price are as follows at the places named:

	Per Cent.
New York	55
Cleveland	50
Chicago	50

SWEDISH (NORWAY) IRON—The average price per 100 lb., in ton lots is:

	Current	One Year Ago
New York	$20.00	$25.50–30.00
Cleveland	20.00	20.00
Chicago	21.00	16.50

In coils an advance of 50c. usually is charged.
Domestic iron (Swedish analysis) is selling at 12c. per lb.

WELDING MATERIAL (SWEDISH)—These prices are the best we have been able to obtain for Swedish welding materials, of which it is reported that very little are on the market.

Welding Wire		Cast-Iron Welding Rods	
⅛, 5/32, 3/16, ¼, 5/16, ⅜, No. 8, 7/16 and No. 10	21.00 to 30.00	⅜ by 12 in. long	14.00
		½ by 19 in. long	12.00
⅝		⅝ by 19 in. long	10.00
No. 12, 7/16, No. 14 and 1/16		⅝ by 21 in. long	10.00
No. 18		Special Welding Wire, Coated	
No. 20		⅛	33.00
		5/32	30.00

Domestic—Welding wire in 100-lb. lots sells as follows, f.o.b. New York: 7/16, 8½c. per lb.; ⅛, 8c.; 5/32 to ¼, 7½c.

MISCELLANEOUS STEEL—The following quotations in cents per pound are from warehouse at the places named:

	New York Current	Cleveland Current	Chicago Current
Openhearth spring steel (heavy)	6.50@7.00	8.00	9.00
Spring steel (light)	11.50	11.00	12.25
Coppered bessemer rods	9.00	8.00	6.75
Hoop steel	6.07	6.50	5.32
Cold-rolled strip steel	12.50	8.25	10.75
Floor plates	6.80	6.00	6.77

PIPE—The following discounts are to jobbers for carload lots on the Pittsburgh basing card, discounts on steel pipe, applying as from January 14, 1920, and on iron pipe from January 7, 1920.

Inches	Steel Black	Steel Galvanized	Inches	Iron Black	Iron Galvanized
		BUTT WELD			
⅛, ¼ and ⅜	47%	20½%	¼ to 1¼	34½%	18½%
½	51%	36½%			
¾ to 3	54%	41½%			
		LAP WELD			
2	47%	34½%	2	28½%	14½%
2½ to 6	50%	37½%	2½ to 6	30½%	17½%
		BUTT WELD, EXTRA STRONG PLAIN ENDS			
⅛, ¼ and ⅜	43%	25½%	½ to ¼	34½%	19½%
½	48%	35½%			
¾ to 1¼	52%	39½%			
		LAP WELD, EXTRA STRONG PLAIN ENDS			
2	45%	33½%	2	29½%	16½%
2½ to 4	48%	36½%	2½ to 4	31½%	19½%
4½ to 6	47%	35½%	4½ to 6	30½%	18½%

Stock discounts in cities named are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
⅜ to 3 in. steel butt welded	40%	24%	40%	31%	54@40%	40½@30%
2½ to 6 in. steel lap welded	35%	20%	42%	27%	50@40%	37½@27½%

Malleable fittings. Class B and C, banded, from New York stock sell at plus 32%. Cast iron, standard sizes, net.

METALS

MISCELLANEOUS METALS—Present and past New York quotations in cents per pound, in carload lots:

	Current	Month Ago	Year Ago
Copper, electrolytic	19.00	19.25	16.75
Tin in 5-ton lots	51.00	61.50	72.50
Lead	9.00@9.25	9.00	5.25
Spelter	7.85	8.70	6.50
	ST. LOUIS		
Lead	8.50	8.87½	4.95
Spelter	7.50	8.37½	6.15

At the places named, the following prices in cents per pound prevail, for 1 ton or more:

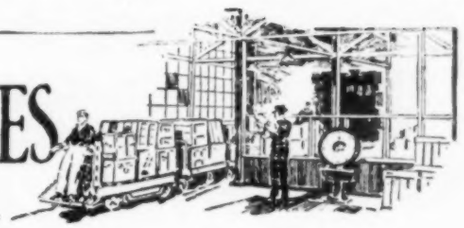
	New York Current	New York Month Ago	New York Year Ago	Cleveland Current	Cleveland Year Ago	Chicago April 8 Current	Chicago April 8 Year Ago
Copper sheets, base	33.50	29.50	23.00	32.00	24.50	36.00	26.00
Copper wire (carload lots)	31.25	31.25	23.00	29.50	24.00	27.00	22.00
Brass sheets	27.50	27.50	20.50	29.00	24.00	27.00	21.50
Brass pipe	32.00	32.00	30.75	34.00	31.00	35.00	31.00
Solder (half and half) (case lots)	43.00	39.00	38.00	40.50	43.00	38.00	39.00

Copper sheets quoted above hot rolled 16 oz., cold rolled 14 oz. and heavier, add 2c.; polished takes 5c. per sq.ft. extra for 20-in. widths and under; over 20 in., 7½c.

BRASS RODS—The following quotations are for large lots, mill, 100 lb. and over, warehouse; net extra:

	Current	One Year Ago
Mill	23.75	18.00
New York	25.00	19.50
Cleveland	27.00	23.00
Chicago	26.00	24.00

SHOP MATERIALS AND SUPPLIES



ZINC SHEETS—The following prices in cents per pound prevail:

Carload lots f.o.b. mill 12.00

	—In Casks—		— Broken Lots —	
	Current	One Year Ago	Current	One Year Ago
Cleveland	15.00	12.95	15.50	13.30
New York	14.00	12.00	14.50	13.00
Chicago	15.00	16.50	15.00	16.00

ANTIMONY—Chinese and Japanese brands in cents per pound, in ton lots for spot delivery, duty paid:

	Current	One Year Ago
New York	9.25	8.50
Chicago	11.50	9.00
Cleveland	12.50	7.75

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

	— New York —			
	Current	One Year Ago	Cleveland	Chicago
Copper, heavy, and crucible	16.00	14.25	16.50	16.00
Copper, heavy, and wire	15.25	13.25	16.50	15.00
Copper, light, and bottoms	13.75	11.25	15.00	14.00
Lead, heavy	7.00	4.25	7.00	7.00
Lead, tea	5.00	3.50	5.00	6.00
Brass, heavy	10.25	8.75	12.50	16.50
Brass, light	7.50	6.50	10.00	10.00
No. 1 yellow brass turnings	8.50	7.75	10.00	10.00
Zinc	5.25	4.25	5.00	6.00

ALUMINUM—The following prices are from warehouse at places named:

	New York	Cleveland	Chicago
No. 1 aluminum, 98 to 99% pure, in ingots for remelting (1-15 ton lots), per lb	33.00	34.00c.@35.00c.	33.50

COPPER BARS—From warehouse sell as follows in cents per pound, for ton lots and over:

	Current	One Year Ago
New York (round)	38.00	25.00
Chicago	29.00	28.00
Cleveland	32.00	26.00

BABBITT METAL—Warehouse price per pound:

	—New York—		—Cleveland—		— Chicago —	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Best grade	90.00	87.00	74.50	79.00	70.00	75.00
Commercial	50.00	42.00	21.50	17.50	15.00	15.00

SHOP SUPPLIES

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

	— New York —		— Cleveland —		— Chicago —	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Hot pressed square	+$4.00	3.25	$ .75	$1.90	$ .50	$2.00
Hot pressed hexagon	+ 4.00	2.70	.75	1.90	.50	2.00
Cold punched hexagon	+ 4.00	3.25	.75	1.90	.50	1.30
Cold punched square	+ 4.00	2.70	.75	1.90	.50	1.30

Semi-finished nuts, ⅝ and smaller, sell at the following discounts from list price:

	Current	One Year Ago
New York	30%	50-10%
Chicago	50%	50%
Cleveland	50%	60-10-10%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
½ by 4 in. and smaller	List	40%	30%
Larger and longer up to 1¼ in. by 30 in.	+20%	20-10%	20%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

For wrought-iron washers:

New York ..... list Cleveland ..... $3.00 Chicago $3.00

For cast-iron washers, ⅜ and larger, the base price per 100 lb. is as follows:

New York ..... $7.00 Cleveland ..... $4.50 Chicago $4.25

CARRIAGE BOLTS—From warehouses at the places named the following discounts from list are in effect:

	New York	Cleveland	Chicago
½ by 6 in. and smaller	10%	35%	20%
Larger and longer up to 1 in. by 30 in.	10%	20%	15%

COPPER RIVETS AND BURS sell at the following rate from warehouse:

	Rivets		Burs	
	Current	One Year Ago	Current	One Year Ago
Cleveland	20%	25%	10%	10%
Chicago	10%	10%	10%	10%
New York	25%	40%	5%	20%

RIVETS—The following quotations are allowed for fair-sized orders from warehouse:

	New York	Cleveland	Chicago
Steel ½ and smaller	30%	40%	35-10%
Tinned	30%	40%	35-10%

Boiler, ½, ⅝, 1 in. diameter by 2 to 5 in. sell as follows per 100 lb.:

New York ..... $7.00 Chicago ..... $5.37 Pittsburgh $4.72

Structural, same sizes:

New York ..... $7.10 Chicago ..... $5.47 Pittsburgh $4.82

MISCELLANEOUS

SEAMLESS DRAWN TUBING—The base price in cents per pound from warehouse in 100-lb. lots is as follows:

	New York	Cleveland	Chicago
Copper	32.00	34.00	35.00
Brass	30.50	34.00	34.00

For immediate stock shipment 3c. is usually added. The prices, of course, vary with the quantity purchased. For lots of less than 100 lb., but not less than 75 lb., the advance is 2c.; for lots of less than 75 lb., but not less than 50 lb. advance is 5c. over base (100-lb. lots); less than 50 lb., but not less than 25 lb. 10c. should be added to base price; quantities from 10-25 lb., extra is 25c.; less than 10 lb., add 35c.

Double above extras will be charged for angles, channels and sheet metal mouldings if ordered in above quantities. Above extras also apply to brass rod other than standard stock sizes—stock sizes being considered as ⅛-2 in. inclusive in rounds, and ½-1½ in., inclusive, in square and hexagon—all varying by thirty seconds up to 1 in. by sixteenths over 1 in. On shipments aggregating less than 100 lb., there is usually a boxing charge of $1.50.

LONG TERNE PLATE—In Chicago No. 28 primes from stock sell, nominally, for $8.50 per 100 lbs.

COTTON WASTE—The following prices are in cents per pound:

	— New York —			
	Current	One Year Ago	Cleveland	Chicago
White	11.00@15.50	13.00	16.00	11.00 to 14.00
Colored mixed	7.00@10.50	9.00-12.00	12.00	9.50 to 12.00

WIPING CLOTHS—Jobbers' price per 1000 is as follows:

	13¼x13¼	13¼x20¼
Cleveland	55.00	65.00
Chicago	41.00	43.50

SAL SODA sells as follows per 100 lb.:

	Current	One Month Ago	One Year Ago
New York	$3.00	$2.25	$1.75
Philadelphia	2.75	2.00	1.75
Cleveland	2.50	2.50	2.75
Chicago	2.50	2.25	2.00

ROLL SULPHUR in 360-lb. bbl. sells as follows per 100 lb.:

	Current	One Month Ago	One Year Ago
New York	*3.90	$4.00	$3.65
Philadelphia	3.65		
Cleveland	4.25	4.25	3.62
Chicago	5.00	5.00	5.00

COKE—The following are prices per net ton at ovens, Connellsville:

	June 3	May 27	May 20
Prompt furnace	$14.50@$15.50	$14.50@$15.50	$13.00@$14.00
Prompt foundry	15.50@16.50	15.50@16.50	14.00@15.00

FIRE CLAY—The following prices prevail:

	Current
Ottawa, bulk in carloads	Per Ton $8.00
Cleveland	100-lb. bag 1.00

LINSEED OIL—These prices are per gallon:

	— New York —		— Cleveland —	— Chicago —	
	Current	One Year Ago		Current	One Year Ago
Raw in barrels (5 bbl. lots)	$1.73	$1.59	$2.02	$2.02	$1.78
5-gal. cans (without cans)	1.75*	1.72	2.27	2.27	1.98

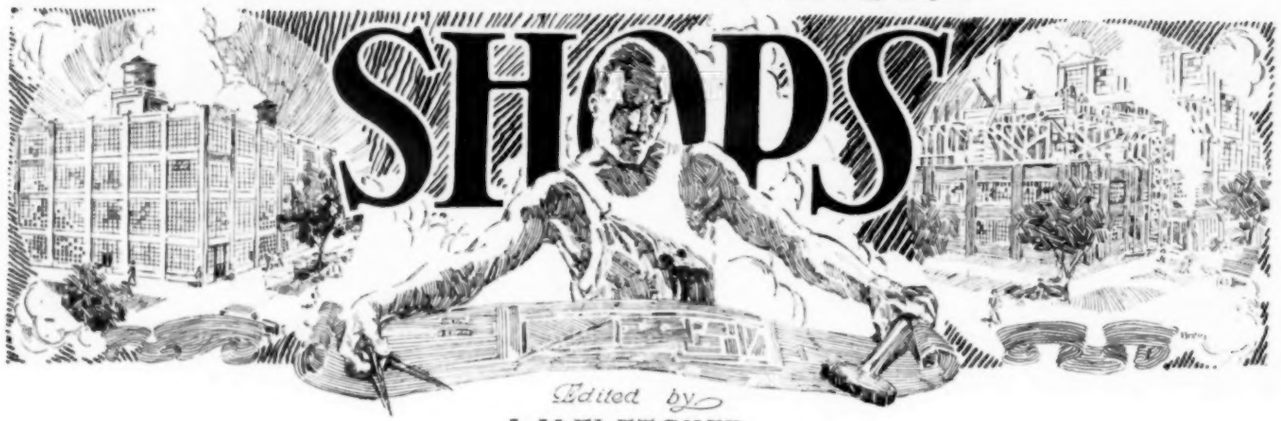
*To this *oil* price must be added the cost of the cans (returnable), which is $2.25 for a case of six.

WHITE AND RED LEAD—Base price per pound:

	— Red —				— White —	
	Current		One Year Ago		Current	One Year Ago
	Dry	In Oil	Dry	In Oil	Dry and In Oil	Dry and In Oil
100 lb. keg	15.50	17.00	13.00	14.50	15.50	13.00
25 and 50-lb. kegs	15.75	17.25	13.25	14.75	15.75	15.25
12½-lb. keg	16.00	17.50	13.50	15.00	16.00	13.50
5-lb. cans	18.50	20.00	15.00	16.50	18.50	15.00
1-lb. cans	20.50	22.00	16.00	17.50	20.50	16.00

500 lb. lots less 10% discount. 2000 lb. lots less 10-2½% discount.

NEW *and* ENLARGED



Edited by
L·V·FLETCHER

Machine Tools

The following concerns are in the market for machine tools:

Mass., Cambridge—P. Gray & Sons, Inc., 286 3rd St., A. P. Morley, Purch. Agt.—power presses equivalent to No. 19 or No. 20 Bliss (No. 19 preferred).

Mass., Waltham—The New England Mica Co., 66 Woerd Ave.—one 42 in. squaring shear (new or used).

Md., Baltimore—Stone & Webster—one 26 in. upright drill press.

Md., Pocomoke City—M. Clogg—repair shop equipment.

N. Y., Buffalo—The Peerless Pattern and Tool Co., 1139 Main St., H. Dawson, Purch. Agt.—milling machine.

N. Y., New York (Borough of Manhattan.)—The New York and Philippine Corp., 150 Nassau St.—lathes and drill presses for export to China, all sizes.

N. Y., Schenectady—The General Electric Co., River Rd.—plain and vertical milling machines.

N. Y., Syracuse—The Dyneto Electric Corp., 301 Wolf St.—one No. 8 duplex Becker Lincoln type milling machine.

Pa., Koppel—The Koppel Industrial Car Co.—one 16 x 70 in. cross head Bull dozer and one double end surface grinder (used).

Pa., Philadelphia—The Penn Industrial Supply Co., 41 North 6th St.—die heads.

Pa., Sharpsburg—The McNeal Bros. Garage Co., 32 Clay St.—upright drilling machines.

Pa., Wilkes-Barre—The Lehigh and Wilkes-Barre Coal Co., Lehigh and Wilkes-Barre Blk.—one 14 in. upright drill press and one 1¼ to 6 in. pipe threading and cutting machine.

Ky., Louisville—The Bonnie Smith Epperson Co.—garage equipment.

Va., Glenallen—F. J. Darling, P. O. Box 43—one 10 and one 6 in. moulder for trimming.

Ill., Chicago—The Atchison, Topeka & Santa Fe Ry., Ry. Exch. Bldg.—one 90 in. driving wheel lathe, standard type, motor drive (motor to be General Electric or Westinghouse), 440 v., 60 cycle, 3 phase, slip ring type (new).

Ill., Chicago—The Chicago, Milwaukee & St. Paul Ry., Ry. Exch. Bldg., W. A. Lynn, Purch. Agt.—

One 2½ in. x 36 in. Pratt & Whitney turntable lathe with equipment "D"; motor drive.

One 2½ in. Acme double bolt cutter with lead screws and power feed for both heads, with 23 sets of cap dies; motor drive.

One Niles 600 ton 96 in. locomotive wheel press with all equipment, without pneumatic attachment for rapid traverse of ram; motor drive.

One 24 in. back geared drill press; motor drive.

One 1,500 lb. Bement single frame steam hammer complete with anvil cap steel dies, oil pump to work under 150 lb. steam pressure, back pressure 3 lb.

One No. 2 inside journal turning attachment with pinion and sleeve, with double quartering attachment for head stock and duplicator for tail stock; motor drive.

One Dreses 60 in. plain radial drill press complete, back geared, power feed, tapping attachment, table, spindle for No. 5 Morse, taper shank; motor drive.

One Long & Allstatter, 48 in. throat double punch and shear; motor drive.

One Hammet link grinding machine capable of grinding links of 60 in. radius and 4½ in. wide.

One 42 in. Gisholt standard vertical boring and turning mill with 2 plain swivel heads, quick power traverse, arranged for variable speed motor drive.

One McGrath pneumatic flue welding machine, capacity 2 to 6 in. flues.

One Ryerson flue welding furnace, capacity up to 6 in. flues.

One locomotive hoist consisting of six 50 ton jacks fitted with General Electric 50 hp. motor.

One 5 hp. motor with starting box and switches for running hammer.

One 10 hp. motor, speed variable from 550 to 1,100 r.p.m. for running boring mill.

All electric equipment to be 220 v., d.c.

Ill., Chicago—The Imperial Belting Co., Lincoln and Kenzie Aves.—one engine lathe, 18 in. swing, 8 or 10 ft. bed with set of gears for screw cutting.

Ill., Waukegan—The Curtis Aeroplane and Motor Corp.—general machine shop equipment.

Mich., Detroit—The Bemb Robinson Co., Jefferson Ave., E.—repair shop equipment for service department.

Mich., Detroit—The Ewing Bolt and Screw Co., Farwell Bldg.—general machine tool equipment for manufacture of bolts, nuts and screws.

Mich., Detroit—The International Metal Stamping Co., Artillery Ave.—equipment for manufacture of metal stampings, including presses.

Mich., Detroit—The P. Koenig Coal Co., 454 Gratiot Ave.—small tools for automobile service department.

O., Bowling Green—The Universal Machine Co.—trimming presses.

O., Cleveland—The Cleveland Abrasive Wheel Co., 2629 East 25th St.—one used lathe, 30 in. swing and short bed, and one small hydraulic press.

O., Columbus—The Eaton Machine Co., 37 South Scioto St., F. S. Fleasel, Purch. Agt.—one shaper and one 60 in. lathe.

O., Columbus—The Elgin Motor Sales Co., 162 North 4th St., O. O. Wilbert, Purch. Agt.—one 8 or 10 in. lathe and one small drill press.

O., Columbus—The Lowe Bros., 200 West Mound St.—one 48 in. lathe (used).

O., Newark—The Wehrle Co.—

One No. 52 Natl. Acme screw machine.

One 20 or 22 in. crank shaper.

One 14 in. tool room lathe with taper attachment.

One No. 3 or 4 Landis universal grinding machine.

One 4 ft. radial drill.

One plating dynamo, 10 v. 500 amperes or more (new or used).

Wis., Chippewa Falls—Tschopp, Durch & Camastral, Elm St.—4 side planer and matcher.

Wis., Janesville—The Wisconsin Carriage Co.—presses.

Wis., Milwaukee—The Atlas Metal Parts Co., 997 15th St.—squaring shears.

Wis., Milwaukee—The Horizontal Hydraulic Hoist Co., 35 25th St.—one drill press and one emery wheel.

Wis., Milwaukee—The M. & R. Mfg. Co., 175 Reed St., B. J. Morgan, Purch. Agt.—one disc grinder and one buffer.

Wis., Milwaukee—The Snap On Wrench Co., 134 Reed St., A. Johnson, Purch. Agt.—machine tools.

Wis., Milwaukee—The Standard Steel Corp., 1251 30th St., C. DeGuenther, Purch. Agt.—one 24 in. single spindle drill press and one flanging machine for working material of 14 in. gauge.

Wis., Oshkosh—The Oshkosh Motor Truck Mfg. Co., 51 Jefferson Ave.—millers, drills, gear cutters, grinders, and forge and heat treating equipment.

Ia., Charles City—The Hart Parr Co.—one small portable shear for shearing agricultural scrap (new or used).

Ia., Mason City—The Hawkeye Supply Co.—one bolt cutter for hand use.

Ia., Perry—The Sitka Tire Core Co.—millers, drills, grinders and polishers.

Mo., St. Louis—The Bremer Aluminum Corp., Boatmen's Bank Bldg.—one No. 3½ A or B Bliss toggle press.

S. D., Sioux Falls—The Symms Brownell Mfg. Co.—one 28 to 34 in. x 12 to 14 in. milling machine and one belt driven air compressor, capacity 150 lb. (used).

Cal., Los Angeles—The Oil Mining Equipment Co., 2026 Santa Fe Ave.—lathes, drill presses, saws, etc.

Cal., Pomona—C. R. May—lathe, compressor, pumps, tanks, etc.

Ont., Galt—The Elliott & Whitehall Co.—lathes.

Ont., Toronto—The Temiskaning & Northern Ontario Ry. Comm., 56 Church St.—$45,000 worth of shop tools.

Holland, Rotterdam—The Co-operative Purchasing Assn. for Dutch Metal Industries, 82 Van Oldenbarnevelt Straat—two spindle nut tapping machines.

Machinery

The following concerns are in the market for machinery:

Md., Baltimore—The Kelly Sawing and Planing Mill Co., President and Fleet Sts., H. S. Worden, Purch. Agt.—30 in. double leather belt, 85 ft. long (used).

Md., Baltimore—Rich Bros., 7-11 East Pratt St.—automatic wood working turning lathe to take up to 36 in., three drumroller feed sanders, one dowel machine for ⅝ to 1¼ in. dowels, one 16 in. lathe and one 12 in. shaper (used).

Md., Baltimore—The Wizard Check Indorser and Printing Machine Co., Inc., 457 Calvert Bldg.—new and improved machinery.

N. Y., Hartford—The Home and Tourist Candy Co., c/o Backoff, Jones & Cook, Archts., Union Bldg., Newark, N. J.—machinery for the manufacture of candy.

N. Y., New York (Borough of Brooklyn)—The Brooklyn Rapid Transit Co., 85 Clinton St.—one 15 and one 5 ton overhead traveling crane, span about 50 ft.

N. Y., New York (Borough of Manhattan)—V. Lowener, 114 Liberty St.—saw sharpening machines, automatic machines for manufacture of tin cans and a labeling machine.

N. Y., Rochester—The Langslow Fowler Co., 216 Jay St.—
Two cut off saws.
Two self-feed circular rip saws.
One double surfacer and one single surfacer.
One glue jointer.
Two jointers.
Two double spindle shapers.
Three band saws.
Two multiple borers.
One post borer.
Three horizontal borers.
Five variety saw benches.
One seat cutting machine.
Two bending presses.
One retort for bending machine.
One steam pump for bending machine.
One sanding machine about 42 in. wide.
Three double drum sand wheels.
Two belt sanding machines.
One upright belt sanding machine.
Two glue heaters with tanks.
One Bilstrom clamp.
One turning lathe.
Two power screw drivers.
Two emery wheels, double.

Pa., Drifton—The Lehigh Valley Coal Co.—5 and 10 ton (used) cranes, span 60 to 100 ft. and two 3 and 5 ton cranes, 25 ft. lift, 39 ft. span.

La., New Orleans—The Floradel Knitting Mill, 1003 Spain St.—knitting machinery and machinery for manufacture and dyeing of hosiery.

N. C., Winston-Salem—The Click Chemical Co.—bottle filling and labeling machinery.

Mich., Detroit—The Bd. of Water Comrs., 232 Jefferson Ave.—traveling crane, 50 ft. span, with equipment. Noted May 27.

Wis., Chippewa Falls—Johnson & Yates—crane for foundry work.

Wis., Fond du Lac—The Excel Candy Co., 86 South Brooke St.—equipment for candy manufacture.

Wis., Grantsburg—J. A. Nielson—machinery for the manufacture of cement building blocks.

Wis., Milwaukee—The Ormsby Auto Equipment Co., 883 Hackett Ave.—equipment for tire repair work.

Wis., Milwaukee—The Wisconsin Electric Mfg. Co., 69 Wisconsin St., W. Fernholz, Purch. Agt.—one band saw.

Wis., Wausau—The Wisconsin Valley Electric Co., 206 3rd St., M. C. Ewing, Purch. Agt.—one 25 ton traveling crane.

Ont., Toronto—C. B. Williams, 11 St. Albans St.—planing machinery and saws.

Ont., Windsor—W. T. Piggott, Dougal Ave. and London St., W.—planing machinery and a saw.

Metal Working

NEW ENGLAND STATES

Conn., Bridgeport—The Bryant Electric Co., 1421 State St., has awarded the contract for the construction of a 4 story, 60 x 130 ft. factory for the manufacture of electric specialties. Estimated cost, $125,000. Noted May 6.

Conn., Hartford—The Hartford Automobile Club Garage Co., 36 Pearl St., will soon award the contract for the construction of a 7 story, 147 x 150 ft. garage on Hicks and South Ann Sts. Estimated cost, $500,000. C. F. Luce, 36 Pearl St., Archt. Noted Jan. 15.

Conn., Hartford—S. Heimovitch, 135 Bellevue St., will soon award the contract for the construction of a 1 story, 45 x 110 ft. garage. Estimated cost, $25,000. H. H. Beckinstin, 1026 Main St., Archt.

Conn., New Britain—The R. Jahn Mfg. Co., 6 Chestnut St., plans to build a factory on Cherry and Ellis Sts., for the manufacture of dies, tools, etc.

Conn., Wallingford—The International Silver Co., 48 State St., Meriden, has awarded the contract for altering its factory and building an addition to its boiler house on Center St., here. Estimated cost, $25,000.

Conn., Waterbury—The International Silver Co., 48 State St., Meriden, has awarded the contract for the construction of a 1 story, 40 x 130 ft. addition to its factory on Silver St., here. Estimated cost, $35,000.

Mass., Boston—L. K. Alintack, c/o Tuck & Gilman, Archts., 34 School St., will soon award the contract for the construction of a 2 story, 75 x 200 ft. garage on Fordham Rd. Estimated cost, $150,000. Noted May 13.

Mass., Springfield—The Bausch Machine Tool Co., 156 Wason Ave., has awarded the contract for the construction of a 1 story, 50 x 80 ft. factory. Estimated cost, $35,000.

Mass., Springfield—The Buckley Fdry. Co., 13½ Cypress St., has awarded the contract for the construction of a 1 story, 85 x 100 ft. foundry on Roseland St., for the manufacture of brass castings. Estimated cost, $15,000.

MIDDLE ATLANTIC STATES

Md., Baltimore—The Dorn Motor Corp., 35 North Bentalou St., will soon award the contract for the construction of a 1 story, 50 x 100 ft. garage. Estimated cost, $20,000.

Md., Baltimore—The Wizard Check Indorser and Printing Machine Co., Inc., 457 Calvert Bldg., plans to build a factory on a 3 acre site on Key Highway and Fort St. Estimated cost, $300,000.

Md., Pocomoke City—M. Clogg has awarded the contract for the construction of a 1 story, 150 x 200 ft. garage and repair shop.

N. J., Newark—R. Heller Co., 209 Plane St., has awarded the contract for the construction of a 2 story, 100 x 100 ft. garage on Plane and James Sts. Estimated cost, $100,000.

N. Y., Buffalo—The Amer. Car and Fdry. Co., 383 Babcock St., has awarded the contract for the construction of a 2 story, 50 x 211 ft. service building and a 2 story, 50 x 140 ft. truck shop. Estimated cost, $140,000.

N. Y. Buffalo—The Buffalo General Electric Co., Electric Bldg., has had plans prepared for the construction of an addition to plant No. 4 on Babcock St. Estimated cost, $20,000.

N. Y., Cazenovia—The Diepress Co. will soon award the contract for the construction of a 2 story, 60 x 160 ft. factory, at its plant, for the manufacture of presses. Estimated cost, $70,000. Monks & Johnson, 99 Chauncey St., Boston, Archts.

N. Y., New York (Borough of Bronx)—The Tremont Webster Building Co., 1162 Boston Rd., will build a 3 story, 150 x 200 ft. addition to its garage on 187th and Concourse Sts. Estimated cost, $250,000.

N. Y., New York (Borough of Brooklyn)—S. Brenner, 102 North 1st St., will build a 1 story, 50 x 100 ft. garage on North 1st St. and Kent Ave. Estimated cost, $20,000.

N. Y., New York (Borough of Brooklyn)—The Empire Moulding Co., 391 Leonard St., will build a 1 story, 25 x 100 ft. garage. Estimated cost, $15,000.

N. Y., New York (Borough of Brooklyn)—J. Macaluso, c/o C. P. Cannella, Archt., 1163 Herkimer St., will build a 1 story, 50 x 100 ft. garage on Hicks St. Estimated cost, $20,000.

N. Y., New York (Borough of Brooklyn)—The New Jersey and New York Realty Co., 129 Front St., New York City, will build a 1 story, 75 x 100 ft. garage on Fulton St. and Troy Ave. Estimated cost, $25,000.

N. Y., New York (Borough of Brooklyn)—The Princess Constr. Co., c/o Ebling & Magnuson, Engrs. and Archts., 52 Vanderbilt Ave., New York City, will build a 1 story, 50 x 100 ft. garage on 30th St. and 3rd Ave. Estimated cost, $45,000.

N. Y., New York (Borough of Manhattan)—The Benensen Realty Co., 509 Willis Ave., will build a 1 story, 100 x 100 ft. garage on Park Ave. and 157th St. Estimated cost, $25,000.

N. Y., New York (Borough of Manhattan)—H. Kline, 532 West 54th St., is having plans prepared by S. J. Kessler, Archt. and Engr., 529 Cortlandt Ave., for the construction of two 1 story garages on 54th and 55th Sts. Estimated cost, $30,000.

N. Y., New York (Borough of Queens)—The Horizontal Hydraulic Hoist Co., 35 25th St., Milwaukee, Wis., plans to build a 1 story, 100 x 150 ft. service station in Long Island City.

Pa., Johnstown—The Cambria Steel Co., Widener Bldg., Philadelphia, plans to expend $42,142,943 for improvements to its plant here, to include new buildings, machinery, houses, etc.

Pa., Philadelphia—The Diesinger Motors Co., 1827 Chestnut St., will soon award the contract for the construction of a 2 story, 70 x 120 ft. sales and service station on 22nd and Chestnut Sts. L. B. Rothchild, 1225 Sansom St., Engr. and Archt.

Pa., Pittsburgh—The Pittsburgh Screw and Bolt Co., Preble Ave., is having plans prepared by A. McKee, Archt., c/o owner, for the construction of a 2 story factory, to have 39,000 sq.ft. of floor space. Estimated cost, $350,000.

SOUTHERN STATES

Ky., Louisville—The Prince Wells Motor Co. plans to build a 74 x 200 ft. garage on 3rd St. and Bway. Estimated cost, $100,000. E. T. Hutching, Columbia Bldg., Archt.

Ky., Louisville—W. E. Ross, 1123 Cherokee Rd., will soon award the contract for the construction of a 5 story garage on Market St. between 2nd and 3rd Sts. Estimated cost, $100,000. Gaffney & Epping, Louisville, Archts. and Engrs. Noted Apr. 8.

MIDDLE WEST

Ill., Chicago—The Barco Mfg. Co., 212 West Illinois St., has awarded the contract for the construction of a 1 story, 150 x 180 ft. factory on Argyle St. and Ravenswood Ave., for the manufacture of railroad supplies. Estimated cost, $125,000.

Ill., Chicago—The Gartland McCarthy Co., c/o Austin Co., Engrs., 208 La Salle St., has awarded the contract for the construction of a plant on Lawndale Ave. and 33rd St., to include a 1 story, 121 x 300 ft. foundry with a cupola wing, 2 story, 40 x 40 ft. foundry, a 1 story, 90 x 260 ft. warehouse and a 1 story, 60 x 100 ft. core building. Estimated cost, $200,000.

Ill., Chicago—The E. Katzinger Co., 120 North Peoria St., will soon award the contract for the construction of a 7 story, 50 x 120 ft. factory on Washington and Sangamon Sts., for the manufacture of bakery equipment. Estimated cost, $200,000. A. S. Alschuler, 28 East Jackson St., Archt.

Mich., Detroit—The Bemb Robinson Co., Jefferson Ave., E., has awarded the contract for the construction of a 3 story, 100 x 120 ft. garage on Congress St. Estimated cost, $90,000.

Mich., Detroit—The Bd. of Water Comrs., 232 Jefferson Ave., will soon award the contract for the construction of a 1 story, 90 x 120 ft. machine repair shop on Glendale Ave.

Mich., Detroit—The Clements Battery Serv. Co., Gratiot Ave. and Grand Blvd., has awarded the contract for the construction of a 1 story, 55 x 130 ft. service station on Grand Blvd. and Michigan Ave. Estimated cost, $35,000. Noted May 13.

Mich., Detroit—The Ewing Bolt and Screw Co., Farwell Bldg., will build a 1 story, 48 x 240 ft. factory for the manufacture of screws and bolts. Estimated cost, $350,000. Noted April 8.

Mich., Detroit—The P. Koenig Coal Co., 454 Gratiot Ave., has awarded the contract for the construction of a 1 story garage on Riopelle St. Estimated cost, $40,000. Noted Apr. 15.

Mich., Detroit—The International Metal Stamping Co., Artillery Ave., will soon award the contract for the construction of a 1 story, 79 x 532 ft. addition to its factory.

Mich., Jackson—The General Machine and Tool Co., 501 Water St., is building a 90 x 150 ft. plant. Estimated cost, $50,000.

Mich., Marysville—The Wills Lee Corp., Book Bldg., Detroit, plans to build a 1 story, 200 x 360 ft. automobile factory here. Smith, Hinchman & Grylls, Washington Arcade, Detroit, Archts.

O., Cleveland — J. Babin, Olmstead Hotel, plans to build a 2 story, 48 x 110 ft. commercial building and garage on Superior Ave. and East 107th St. Estimated cost, $100,000.

O., Cleveland—The C. F. Hanger Co., 6520 Carnegie Ave., manufacturer of carriages and wagons, has awarded the contract for the construction of a 1 story, 65 x 272 ft. factory at 2046 East 71st St. Estimated cost, $75,000.

O., Cleveland—The McClellan File Co., 3400 Hamilton Ave., has awarded the contract for the construction of a 1 story, 62 x 120 ft. addition to its factory. Estimated cost, $30,000.

O., Cleveland—The Willard Storage Battery Co., 246 East 131st St., will build a 1 story, 25 x 260 ft. sheet metal factory. Estimated cost, $10,000.

O., Kenton—The Kenton Hardware Co. has awarded the contract for the construction of a 60 x 190 ft. foundry building. Estimated cost, $50,000.

O., Lakewood—The White Sewing Machine Co., East 79th St. and St. Clair Ave., Cleveland, plans to build a 3 story factory along the tracks of the Nickel Plate R.R. near Detroit Ave., here, to replace the one which was recently destroyed by fire. Estimated cost, $200,000.

O., Warren—The Trumbull Cliffs Furnace Co., Rockefeller Bldg., Cleveland, is having plans prepared for the construction of a 1 story blast furnace, here, to have a capacity of 600 tons. Estimated cost, $1,000,000. Freyn, Brassert & Co., 122 South Michigan Ave., Chicago, Engrs.

Wis., Milwaukee—The Dravo Co., 1195 30th St., manufacturer of super heaters, has awarded the contract for the construction of a 1 story, 60 x 100 ft. addition to its factory. Estimated cost, $25,000.

Wis., Milwaukee—The Packard Motor Car Co., Blvd. and Belt Line, Detroit, Mich., plans to build a 1 story, 80 x 200 ft. garage and repair shop on 35th St., here.

Wis., Milwaukee—The Western Metal Specialty Co., 1919 St. Paul Ave., plans to build a 1 story addition to its factory.

WEST OF THE MISSISSIPPI

Mo., St. Louis—The St. Louis Blow Pipe Co., 9th and Chamber Sts., has awarded the contract for the reconstruction of its 1 story, 80 x 142 ft. factory. Estimated cost, $25,000.

Mo., St. Louis—The St. Louis Mall Casting Co., 7701 North Conduit St., has awarded the contract for the construction of a 1 story, 100 x 484 and 40 x 100 ft. foundry at 347 Thatcher St. Estimated cost, $120,000.

Mo., St. Louis—The Standard Stamping Co., 2nd and Madison Sts., has awarded the contract for the construction of a 5 story, 53 x 60 ft. factory at 204 Madison St. Estimated cost, $35,000.

Okla., Okmulgee—J. M. Moore is having plans prepared by Smith, Rea, Lovitt & Senter, Archts., Parkinson Bldg., for the construction of a 4 story, 100 x 100 ft. garage. Estimated cost, $250,000.

Tex., Houston—The city, c/o H. Wise, Mayor, plans to improve its shops and build a new power house and barn. Estimated cost, $63,000.

WESTERN STATES

Cal., Los Angeles—The Oil Mining Equipment Co., 2026 Santa Fe Ave., will build a plant to include an 80 x 547 ft. main factory with 60 x 150 ft. wing, 20 x 200 ft. shed, boiler house, etc.

Cal., Los Angeles—The Schultheiss Mfg. Co., Boyle Ave., is building a plant on Slauson Ave., for the manufacture of plumbing supplies, to include a 50 x 225 ft. factory, 20 x 45 ft. core room, 20 x 35 ft. cooling room, office, etc.

Cal., Pomona—C. R. May plans to build a 137 x 142 ft. garage on Holt and Garey Aves. R. H. Orr, 1301 Van Nuys Bldg., Los Angeles, Archt.

Cal., San Francisco—S. Chamberlain, c/o O'Brien Bros., Archts., 240 Montgomery St., is having plans prepared for the construction of a 5 story, 70 x 90 ft. garage on Stevenson St.

CANADA

Ont., Blenheim—T. W. Graham plans to build a 1 story garage. Estimated cost, $25,000.

Ont., Ft. William—The Canada Iron Fdry., Ltd., has awarded the contract for the construction of a 1 story, 40 x 80 ft. foundry. Estimated cost, $20,000.

Ont., Galt—The Elliott & Whitehall Co. plans to build a 1 story, 60 x 100 ft. machine shop on Hobson St. Estimated cost, $25,000. J. Evans, 30 Walter St., N., Archt.

Ont., Guelph—The Gilson Mfg. Co. is building a 2 story, 80 x 120 ft. machine shop and assembling room at its plant.

General Manufacturing

NEW ENGLAND STATES

Mass., Hudson—The Apsley Rubber Co. will soon award the contract for the construction of a 5 story, 60 x 100 ft. factory at its plant. Estimated cost, $125,000. The H. M. Hope Eng. Co., 185 Devonshire St., Archts. and Engrs.

R. I., Bristol—The Cranston Worsted Co. 180 Thames St., is having plans prepared by Jenks & Ballou, Archts., 735 Grosvenor Bldg., Providence, for the construction of a 100 x 134 ft. textile mill. Estimated cost, $160,000.

Vt., St. Johnsbury—The A. H. McLeod Milling Co., Mill St., has awarded the contract for the construction of an addition to its flour and feed mill. Estimated cost, $50,000. Noted Mar. 4.

MIDDLE ATLANTIC STATES

Md., Baltimore—The Delion Tire Co., 131 Mt. Royal Ave., is having plans prepared by J. O. Hunt, Archt., 114 North Montgomery Ave., Trenton, N. J., for the construction of a 1 story, 90 x 400 ft. and 2 story, 60 x 70 ft. tire factory, power plant and office. Estimated cost, $100,000. R. B. Arnold, 131 West Mt. Royal Ave., Engr.

N. Y., Hartford—The Home and Tourist Candy Co., c/o Backoff, Jones & Cook, Archts., Union Bldg., Newark, N. J., plans to build a 2 story factory, here. Estimated cost, $50,000.

N. Y., New York (Borough of Bronx)—V. Vivaudou, Inc., Times Bldg., manufacturer of perfume, has awarded the contract for the construction of a group of factory buildings on Southern Blvd. and Liggett Ave., to have 122,000 sq.ft. of floor space. Estimated cost, $1,000,000.

Pa., Florin—The Nissley Sons Chocolate Co. has awarded the contract for the construction of a 4 story, 50 x 100 ft. factory. Estimated cost, $60,000.

Pa., Frankfort Junction (Philadelphia P. O.)—The Belmont Packing and Rubber Co., 133 North 2nd St., Philadelphia, has awarded the contract for the construction of a 2 story, 120 x 120 ft. factory here. Estimated cost, $100,000. Noted Jan. 29.

SOUTHERN STATES

Ky., Louisville—The Peerless Pencil Co. plans to build a factory. Estimated cost $200,000.

La., New Orleans—The Floradel Knitting Mill, 1003 Spain St., has awarded the contract for the construction of a 2 story, 32 x 100 ft. addition to its mill. Estimated cost, $20,000.

Va., Richmond—The Liggett & Myers Tobacco Co., 100 South 7th St., has had plans prepared by Francisco & Jacobus, Archts., 511 5th Ave., New York City, for the construction of a 6 story, 96 x 130 x 195 ft. tobacco factory. Estimated cost, $350,000.

Va., Richmond—R. J. Reynold, 12th and Byrd Sts., has had plans prepared for the construction of a 1 story, 49 x 53 x 266 ft. tobacco curing plant on Byrd St. between 10th and 11th Sts. Estimated cost, $25,000.

S. C., Columbia—The Columbia Ry. Gas and Electric Co. plans to enlarge its plant. Estimated cost, $400,000. The J. B. White Eng. Corp., 43 Exch. Pl., New York City, Engrs.

MIDDLE WEST

Ill., Marseilles—The Natl. Biscuit Co., 10th Ave. and 15th St., New York City, will soon award the contract for the construction of an 8 story factory and warehouse here. Estimated cost, $800,000. A. G. Zimmerman, 85 9th Ave., New York City, Archt.

O., Cleveland—The Mendelsohn Co., 2110 Woodland Ave., manufacturer of cigars, will soon award the contract for the construction of a 2 story, 70 x 100 ft. addition to its factory on East 27th St. and Woodland Ave. Estimated cost, $50,000.

O., Lorain—The J. C. Newman Cigar Co., 3803 Woodland Ave., Cleveland, will soon award the contract for the construction of a 2 story addition to its factory. Estimated cost, $50,000. Noted Apr. 1.

Wis., Fond du Lac—The Excel Candy Co., 86 South Brooke St., plans to build a candy factory.

Wis., Galesville—The Galesville Canning Co., Analoska St., has awarded the contract for the construction of a canning plant. Estimated cost, $100,000. Noted May 13.

Wis., Milwaukee—The Home and Tourist Candy Co., c/o Backoff, Jones & Cook, Archts., Union Bldg., Newark, N. J., is having plans prepared for the construction of a 2 story candy factory, here. Estimated cost, $50,000.

Wis., Racine—S. C. Johnson & Son, 1012 16th St., will soon award the contract for the construction of a 4 story, 60 x 160 ft. warehouse and varnish plant on 16th St. A. Guilbert, Robinson Blk., Archt.

WEST OF THE MISSISSIPPI

Ia., Perry—The Sitka Tire Core Co. will build a 30 x 110 ft. plant.

Minn., Coleraine—The Bd. Educ. will soon award the contract for the construction of a 2 story, 200 x 200 ft. high school to include a manual training department. Estimated cost, $350,000. W. T. Bray, 616 Torrey Bldg., Duluth, Archt.

Minn., Lewiston—The Bd. Educ. is having plans prepared by Croft & Berner, Archts., Palace Bldg., Minneapolis, for the construction of a 3 story, 60 x 100 ft. addition to the high and grade school, to include a manual training department. Estimated cost, $125,000.

S. D., Arlington—The Bd. Educ. is having plans prepared by H. Parsons, Archt., 600 Builders Exch., Minneapolis, for the construction of a school to include a manual training department. C. G. DeBoer, Clerk.

WESTERN STATES

Cal., Fresno—The Albers Bros. Milling Co., 332 Pine St., San Francisco, has purchased a site here, and plans to build a cereal mill. Estimated cost, $250,000.

Cal., Los Angeles—The Miller Rubber Co., South High St., Akron, O., has awarded the contract for the construction of a tire factory here, to have a daily capacity of 2,800 casings.

Cal., San Francisco—The Lipton Tea Co., 561 Mission St., plans to build a plant for packing tea, coffee and cocoa. Estimated cost, $500,000. S. Q. Grady, Mgr.

Utah, Ogden—The Globe Grain and Milling Co. is building an 8 story, 50 x 150 ft. flour mill. Estimated cost, $450,000.

CANADA

Ont., Toronto—C. B. Williams, 11 St. Albans St., is building a 2 story planing mill to replace the one which was recently destroyed by fire. Estimated cost, $30,000.

Ont., Windsor—W. T. Piggott, Dougal Ave. and London St., W., plans to build a 1 story, 60 x 80 ft. planing mill. Estimated cost, $35,000.

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